

GROUP 23A

AUTOMATIC TRANSAXLE

CONTENTS

| | | | |
|--|---------------|---|----------------|
| GENERAL DESCRIPTION | 23A-3 | SYMPTOM PROCEDURES | 23A-282 |
| AUTOMATIC TRANSAXLE DIAGNOSIS | 23A-14 | DATA LIST REFERENCE TABLE | 23A-342 |
| DIAGNOSTIC TROUBLESHOOTING FLOW | 23A-14 | ACTUATOR TEST REFERENCE TABLE . . . | 23A-348 |
| INTRODUCTION TO A/T DIAGNOSIS | 23A-14 | INVECS-II CANCEL COMMAND | 23A-349 |
| A/T DIAGNOSTIC TROUBLESHOOTING STRATEGY | 23A-15 | PCM TERMINAL VOLTAGE REFERENCE CHART FOR TRANSAXLE OPERATION . . . | 23A-349 |
| DIAGNOSTIC FUNCTION | 23A-15 | PCM TERMINAL RESISTANCE AND CONTINUITY INSPECTION CHART | 23A-352 |
| HOW TO INITIALIZE A/T LEARNING VALUE | 23A-19 | INSPECTION PROCEDURE USING AN OSCILLOSCOPE | 23A-352 |
| FAIL-SAFE/BACKUP FUNCTION | 23A-20 | A/T FAULTY OPERATION PREVENTION MECHANISM DIAGNOSIS | 23A-353 |
| ROAD TEST | 23A-21 | INTRODUCTION TO A/T KEY INTERLOCK AND SHIFT LOCK MECHANISMS | 23A-353 |
| TORQUE CONVERTER STALL TEST | 23A-28 | A/T KEY INTERLOCK AND SHIFT LOCK MECHANISMS DIAGNOSTIC TROUBLESHOOTING STRATEGY | 23A-353 |
| HYDRAULIC PRESSURE TESTS | 23A-29 | SYMPTOM CHART | 23A-353 |
| HYDRAULIC CIRCUIT | 23A-34 | SYMPTOM PROCEDURES | 23A-354 |
| LINE PRESSURE ADJUSTMENT | 23A-42 | | |
| DIAGNOSTIC TROUBLE CODE CHART . . . | 23A-42 | | |
| SYMPTOM CHART | 23A-44 | | |
| DIAGNOSTIC TROUBLE CODE PROCEDURES | 23A-45 | | |

Continued on next page

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES
 **WARNING**

- *Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).*
- *Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.*
- *MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B - Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.*

NOTE

The SRS includes the following components: SRS air bag control unit, SRS warning light, front impact sensors, air bag module, clock spring, and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

| | | | |
|----------------------------------|----------------|------------------------------------|----------------|
| SPECIAL TOOLS | 23A-361 | TRANSAXLE CONTROL* | 23A-380 |
| ON-VEHICLE SERVICE | 23A-364 | REMOVAL AND INSTALLATION | 23A-380 |
| A/T CONTROL COMPONENT LAYOUT .. | 23A-364 | INSPECTION..... | 23A-381 |
| ESSENTIAL SERVICE | 23A-366 | DISASSEMBLY AND ASSEMBLY | 23A-382 |
| TRANSMISSION FLUID CHECK | 23A-366 | INSPECTION..... | 23A-384 |
| TRANSMISSION FLUID CHANGE..... | 23A-367 | A/T KEY INTERLOCK AND SHIFT | |
| FLUSHING COOLERS AND TUBES | 23A-369 | LOCK MECHANISMS* | 23A-385 |
| OIL COOLER FLOW CHECK..... | 23A-371 | REMOVAL AND INSTALLATION | 23A-385 |
| TRANSMISSION RANGE SWITCH | | INSPECTION..... | 23A-386 |
| CHECK | 23A-372 | TRANSAXLE ASSEMBLY | 23A-387 |
| TRANSMISSION RANGE SWITCH AND | | REMOVAL AND INSTALLATION | |
| CONTROL CABLE ADJUSTMENT..... | 23A-372 | <F4A4B> | 23A-387 |
| AUTOMATIC TRANSAXLE CONTROL | | REMOVAL AND INSTALLATION | |
| COMPONENT CHECK | 23A-374 | <F4A5A> | 23A-395 |
| CRANKSHAFT POSITION SENSOR | | TRANSMISSION FLUID COOLER, | |
| CHECK | 23A-374 | HOSE AND PIPE | 23A-403 |
| TRANSMISSION FLUID TEMPERATURE | | REMOVAL AND INSTALLATION | |
| SENSOR CHECK..... | 23A-374 | <F4A4B> | 23A-403 |
| TRANSMISSION RANGE SWITCH | | REMOVAL AND INSTALLATION | |
| CHECK | 23A-375 | <F4A5A> | 23A-404 |
| STOPLIGHT SWITCH CHECK | 23A-375 | SPECIFICATIONS | 23A-405 |
| A/T CONTROL RELAY CHECK..... | 23A-375 | FASTENER TIGHTENING | |
| SOLENOID VALVE CHECK | 23A-376 | SPECIFICATIONS | 23A-405 |
| SELECTOR LEVER OPERATION | | SERVICE SPECIFICATIONS | 23A-406 |
| CHECK | 23A-377 | LUBRICANT | 23A-406 |
| KEY INTERLOCK AND SHIFT LOCK | | | |
| MECHANISM CHECK | 23A-378 | | |
| TRANSAXLE CONTROL CABLE | | | |
| ADJUSTMENT | 23A-379 | | |

GENERAL DESCRIPTION

M1231000100366

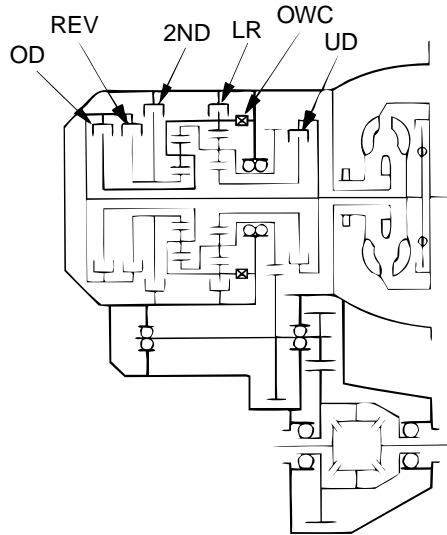
F4A4B and F4A5A models have been established.

| ITEM | | SPECIFICATION | |
|---|-------------------------------|---|--|
| Transaxle model | | F4A4B-4-L1Z | F4A5A-4-F1Z |
| Engine model | | 4G69-MPI-MIVEC | 6G75-MPI |
| Torque converter | Type | 3-element, 1-stage, 2-phase type | |
| | Lock-up | Provided | |
| | Stall torque ratio | 2.0 | 1.7 |
| Transaxle type | | 4 forward speeds, 1 reverse speed, fully automatic | |
| Transaxle gear ratio | 1st | 2.842 | 2.842 |
| | 2nd | 1.573 | 1.576 |
| | 3rd | 1.000 | 1.000 |
| | 4th | 0.688 | 0.686 |
| | Reverse | 2.214 | 2.193 |
| Final reduction ratio (Differential gear ratio) | | 4.212 | 3.728 |
| Clutch | | Multi-disc type 3 sets | |
| Brake | | Multi-disc type 2 sets | |
| Manual control system | | P-R-N-D-3-2-L (7 positions) | P-R-N-D (4 position) + Sport mode (up, down) |
| Shift pattern control | | Electronic control | |
| Hydraulic control during shifting | | Electronic control (Each clutch hydraulically independently controlled) | |
| Torque converter clutch control | | Electronic control | |
| Transmission fluid | Specified lubricants | DIAMOND ATF SP III | |
| | Quantity dm ³ (qt) | 7.7 (8.1) | 8.4 (8.9) |

TRANSAXLE

The transaxle is made up of the torque converter and gear train. A 3-element, 1-stage, 2-phase torque converter with built-in torque converter clutch is used. The gear train is made up of four sets of multi-disc clutches, two sets of multi-plate brakes, one set of one-way clutches and two sets of planetary gears. The planetary gears are made up of sun gears, carriers, pinion gears and annulus gears.

TRANSAXLE CONFIGURATION DRAWING



AC001813 AB

COMPONENTS AND FUNCTIONS

| COMPONENT | | FUNCTION |
|-------------------|-----|---|
| Underdrive clutch | UD | connects the input shaft to the underdrive sun gear. |
| Reverse clutch | REV | connects the input shaft to the reverse sun gear. |
| Overdrive clutch | OD | connects the input shaft to the overdrive planetary carrier. |
| Low-reverse brake | LR | holds the low-reverse annulus gear and the overdrive planetary carrier. |
| Second brake | 2ND | holds the reverse sun gear. |
| One-way clutch | OWC | restricts the rotation direction of the low-reverse annulus gear. |

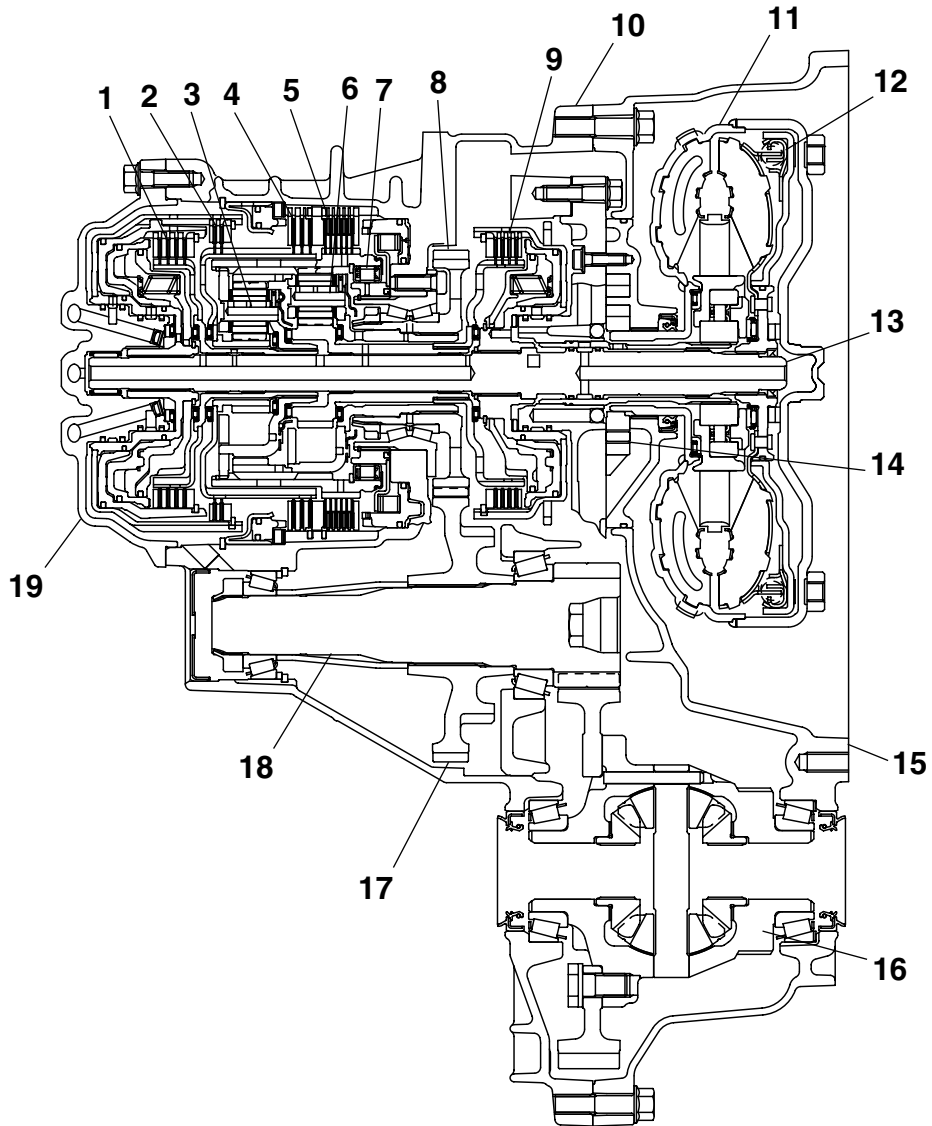
FUNCTION ELEMENT TABLE

| OPERATING ELEMENT TRANSMISSION RANGE | | ENGINE START | PARKING MECHANISM | UNDER DRIVE CLUTCH (UD) | REVERSE CLUTCH (REV) | OVER- DRIVE CLUTCH (OD) | LOW- REVERSE BRAKE (LR) | SECOND BRAKE (2ND) |
|---|---------|-----------------|----------------------|----------------------------------|----------------------------|----------------------------------|-------------------------------|--------------------------|
| P | Parking | OK | × | – | – | – | × | – |
| R | Reverse | – | – | – | × | – | × | – |
| N | Neutral | OK | – | – | – | – | × | – |
| Sport mode | 1st | – | – | × | – | – | × | – |
| | 2nd | – | – | × | – | – | – | × |
| | 3rd | – | – | × | – | × | – | – |
| | 4th | – | – | – | – | × | – | × |

×: Function element –: Not applicable

NOTE: * operates only when the vehicle is stationary [at approximately 10 km/h (6.2 mph) or less].

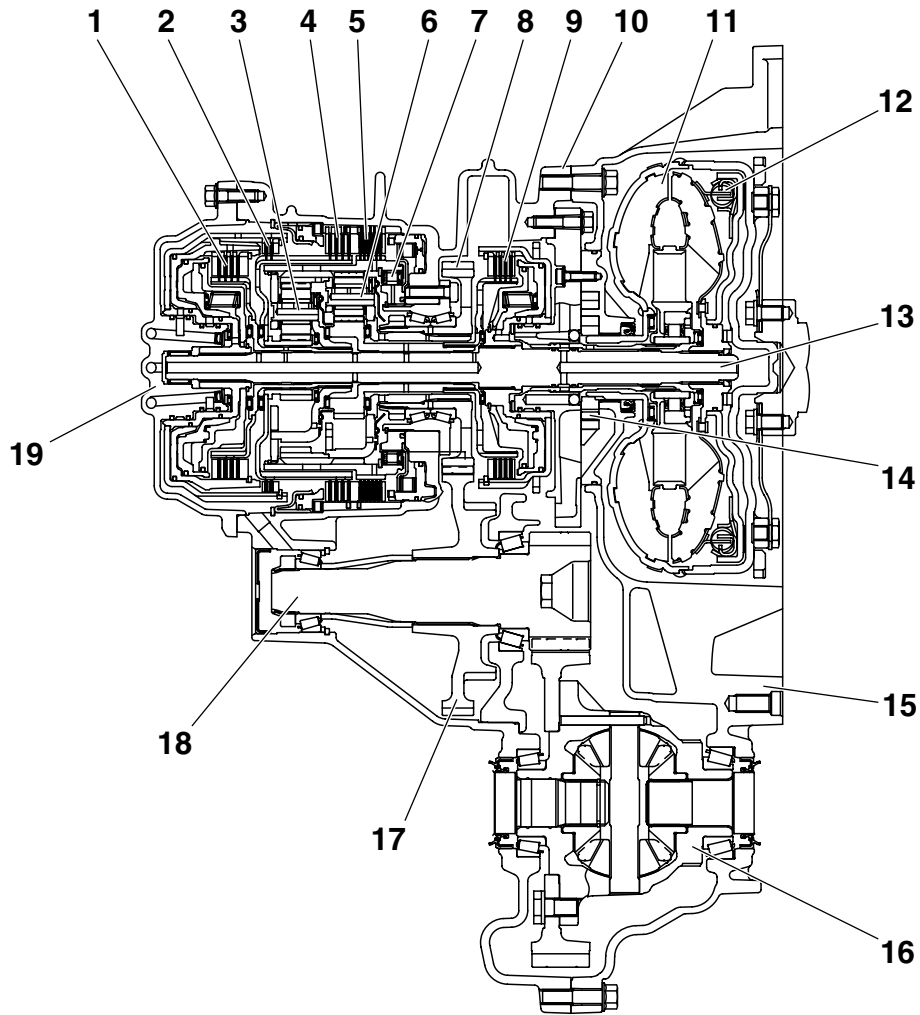
SECTIONAL VIEW <F4A4B>



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- | | |
|--------------------------------|------------------------------|
| 1. OVERDRIVE CLUTCH | 11. TORQUE CONVERTER |
| 2. REVERSE CLUTCH | 12. TORQUE CONVERTER CLUTCH |
| 3. OVERDRIVE PLANETARY CARRIER | 13. INPUT SHAFT |
| 4. SECOND BRAKE | 14. OIL PUMP |
| 5. LOW-REVERSE BRAKE | 15. TORQUE CONVERTER HOUSING |
| 6. OUTPUT PLANETARY CARRIER | 16. DIFFERENTIAL |
| 7. ONE-WAY CLUTCH | 17. TRANSFER DRIVEN GEAR |
| 8. TRANSFER DRIVE GEAR | 18. OUTPUT SHAFT |
| 9. UNDERDRIVE CLUTCH | 19. REAR COVER |
| 10. TRANSAXLE CASE | |

SECTIONAL VIEW <F4A5A>



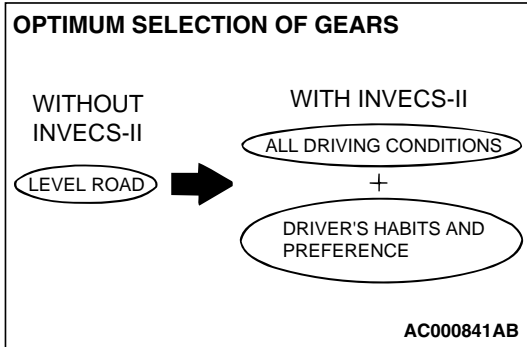
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- | | |
|---|--|
| <ul style="list-style-type: none"> 1. OVERDRIVE CLUTCH 2. REVERSE CLUTCH 3. OVERDRIVE PLANETARY CARRIER 4. SECOND BRAKE 5. LOW-REVERSE BRAKE 6. OUTPUT PLANETARY CARRIER 7. ONE-WAY CLUTCH 8. TRANSFER DRIVE GEAR 9. UNDERDRIVE CLUTCH 10. TRANSAXLE CASE | <ul style="list-style-type: none"> 11. TORQUE CONVERTER 12. TORQUE CONVERTER CLUTCH 13. INPUT SHAFT 14. OIL PUMP 15. TORQUE CONVERTER HOUSING 16. DIFFERENTIAL 17. TRANSFER DRIVEN GEAR 18. OUTPUT SHAFT 19. REAR COVER |
|---|--|

ELECTRONICALLY-CONTROLLED SYSTEM

INVECS-II

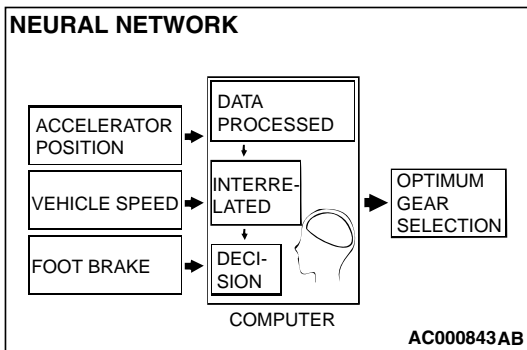
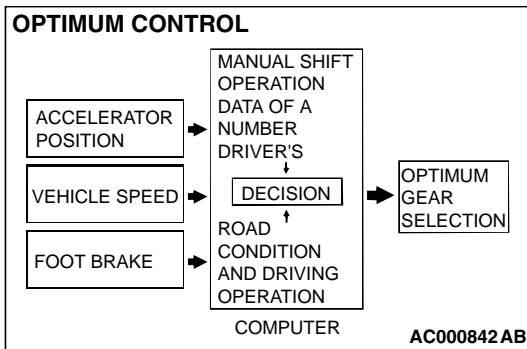
- When in drive ("D" range), the new automatic transaxle employs an innovative shift schedule to provide a high level of comfort and "easy driving style" that matches all driving conditions as well as the driver's driving style.
- INVECS-II features "Optimum Shift Control," which provides shift timing the average driver perceives to be the optimum timing under any road conditions. "Adaptive Shift Control" adjusts shift timing to match the driving habits and preferences of individual drivers.



FEATURES

OPTIMUM SHIFT CONTROL

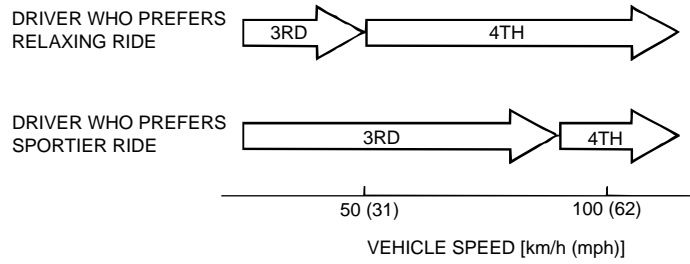
1. The shift patterns found satisfying by the typical driver for all ranges of driving are stored in the computer's memory. The computer uses this data to analyze road conditions and the driver's style of operation, and then outputs the optimal shift patterns stored in its memory to best match the conditions.
2. We introduce the latest control technologies with an innovative new algorithm called the "neural network" that works to imitate the decision-making processes of the human brain. The neural network links a wide variety of input data regarding road and operating conditions, and instantly makes accurate shift control decisions.



ADAPTIVE SHIFT CONTROL

1. The computer learns the driving habits and preferences of each individual driver by processing driving data on engine output, tire load, foot brake operation, etc. It then uses this data to adjust shift timing to best suit the driver's style.
2. If the computer determines from the driving patterns that the driver is one who enjoys a relaxed, unhurried style, it adjusts timing to execute up-shifts at a lower engine speed to provide a smooth, quiet ride. On the other hand, if the computer determines the driver to prefer a sporty ride, it adjusts timing to shift up at a higher engine speed to provide more powerful response.

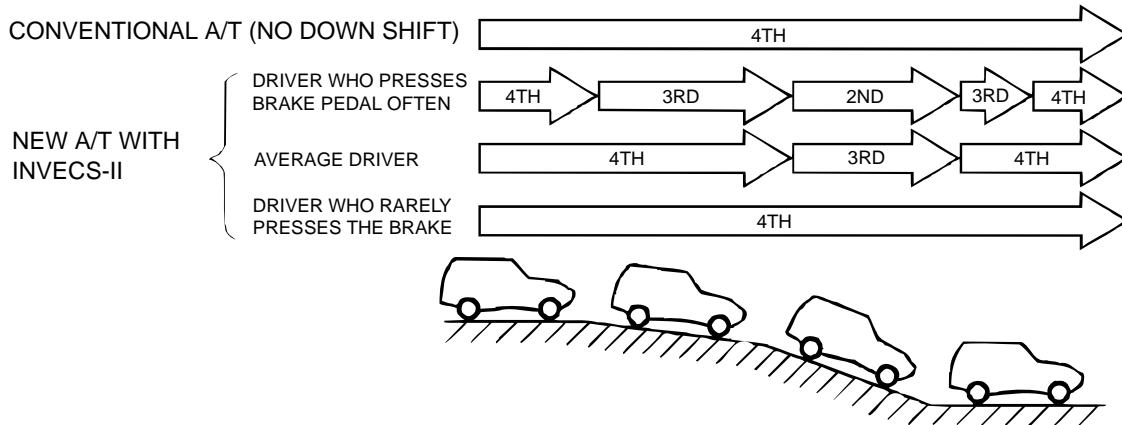
ADAPTIVE SHIFT CONTROL DURING ACCELERATION



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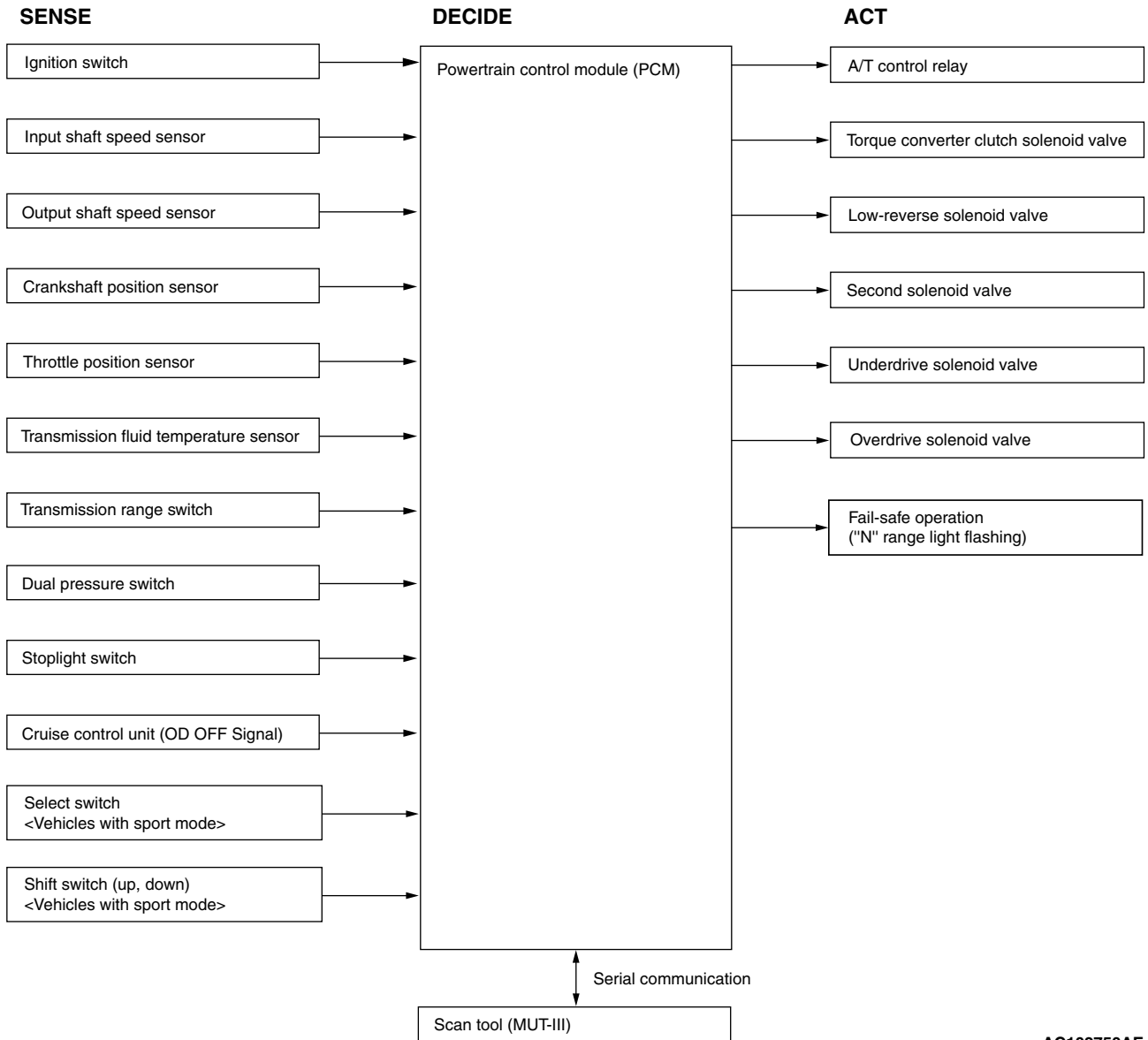
3. If the computer determines that the driver tends to apply the brakes often on a descending roadway, it adjusts timing to down shift sooner so that engine braking is more effectively applied. Conversely, if the computer determines that the driver does not brake much while driving downhill, it delays downshifting to minimize the effect of engine braking.

ADAPTIVE SHIFT CONTROL ON DOWNGRADES



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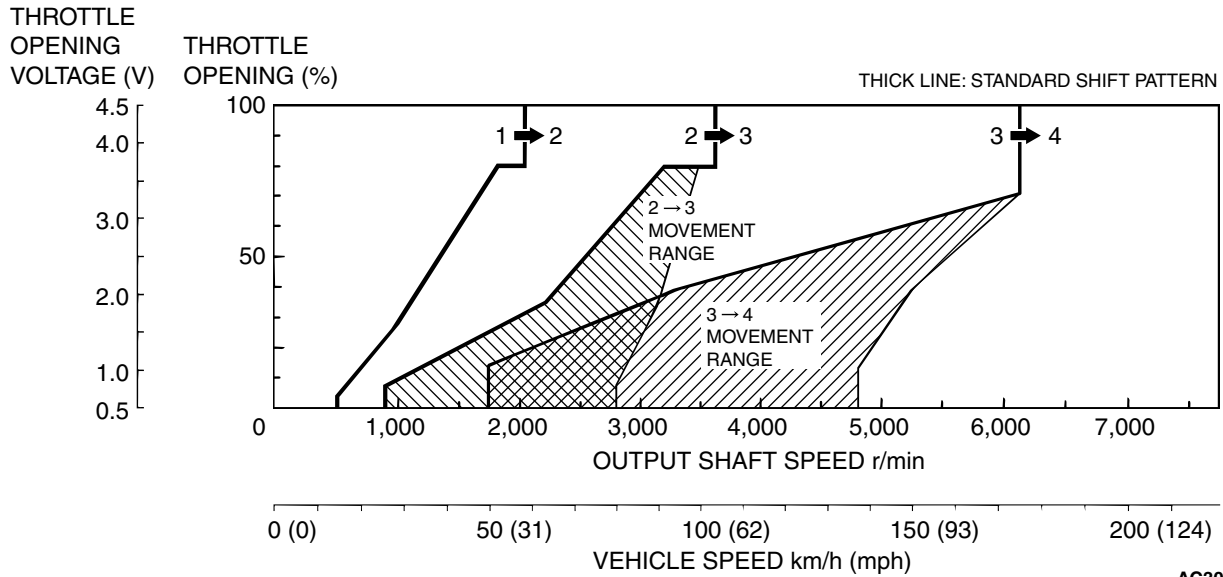
SYSTEM CONSTRUCTION DIAGRAM



AC102750AE

SHIFT PATTERN CONTROL

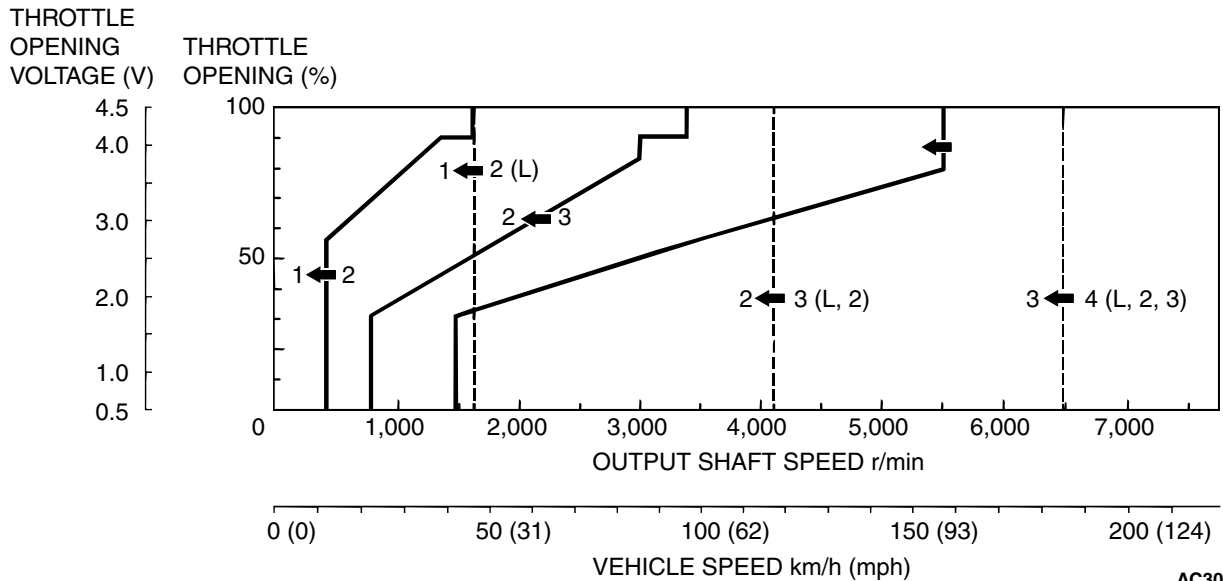
UPSHIFT PATTERN <F4A4B>



AC306491AC

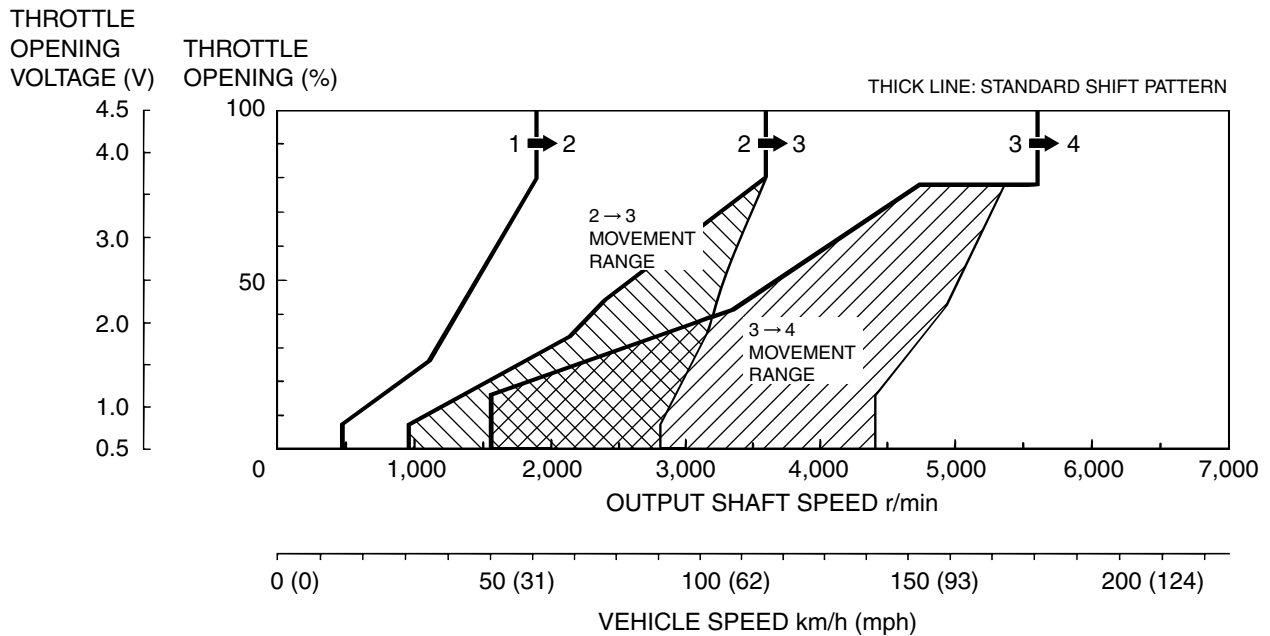
NOTE: Within 2-to-3 and 3-to-4 movement ranges, the PCM adjusts shift points according to the driving conditions by memorizing the accelerator pedal stroke and braking timing.

DOWNSHIFT PATTERN <F4A4B>



AC306492AB

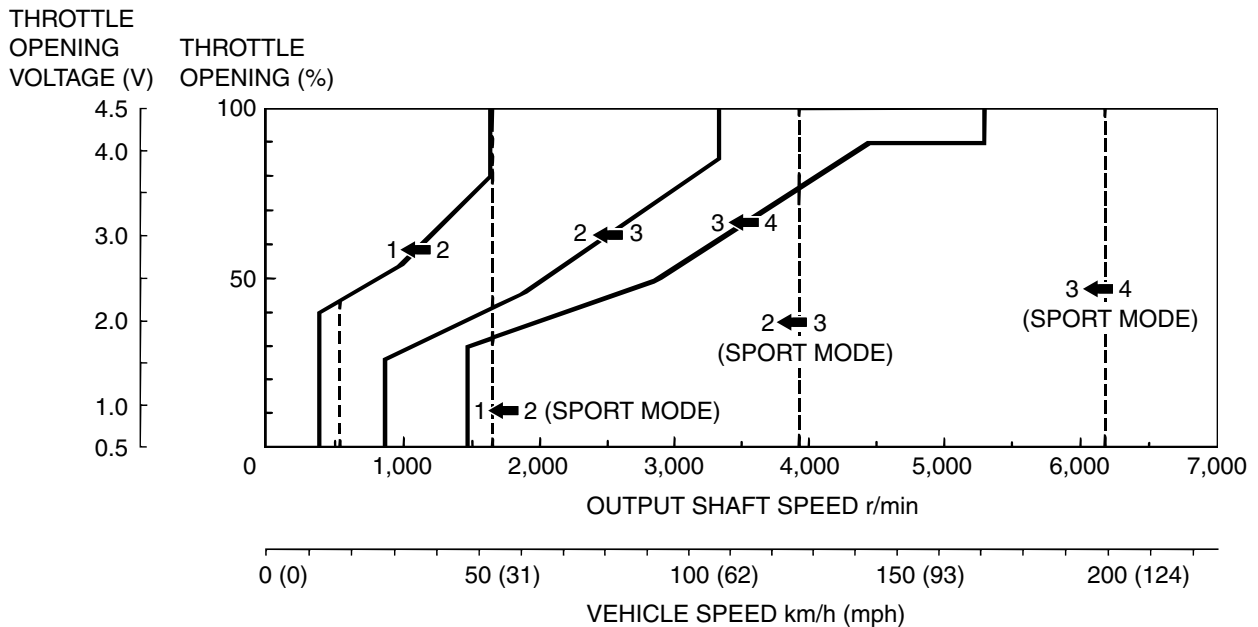
UPSHIFT PATTERN <F4A5A>



AC306570AC

NOTE: Within 2-to-3 and 3-to-4 movement ranges, the PCM adjusts shift points according to the driving conditions by memorizing the accelerator pedal stroke and braking timing.

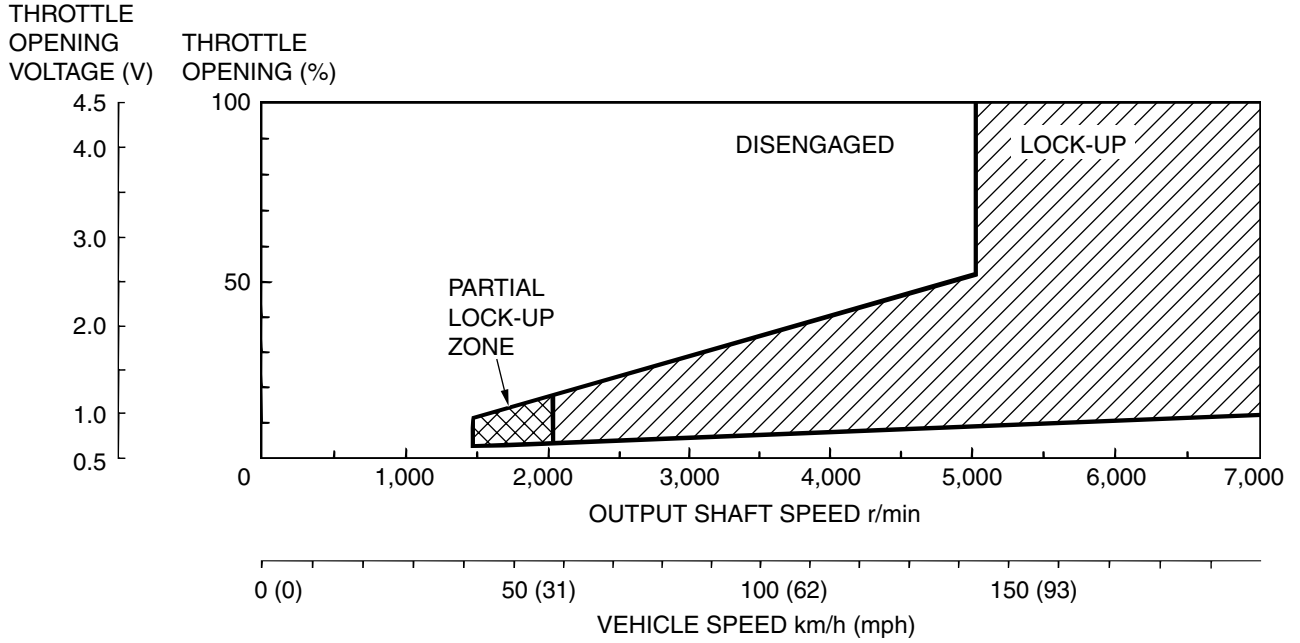
DOWNSHIFT PATTERN <F4A5A>



AC306571AB

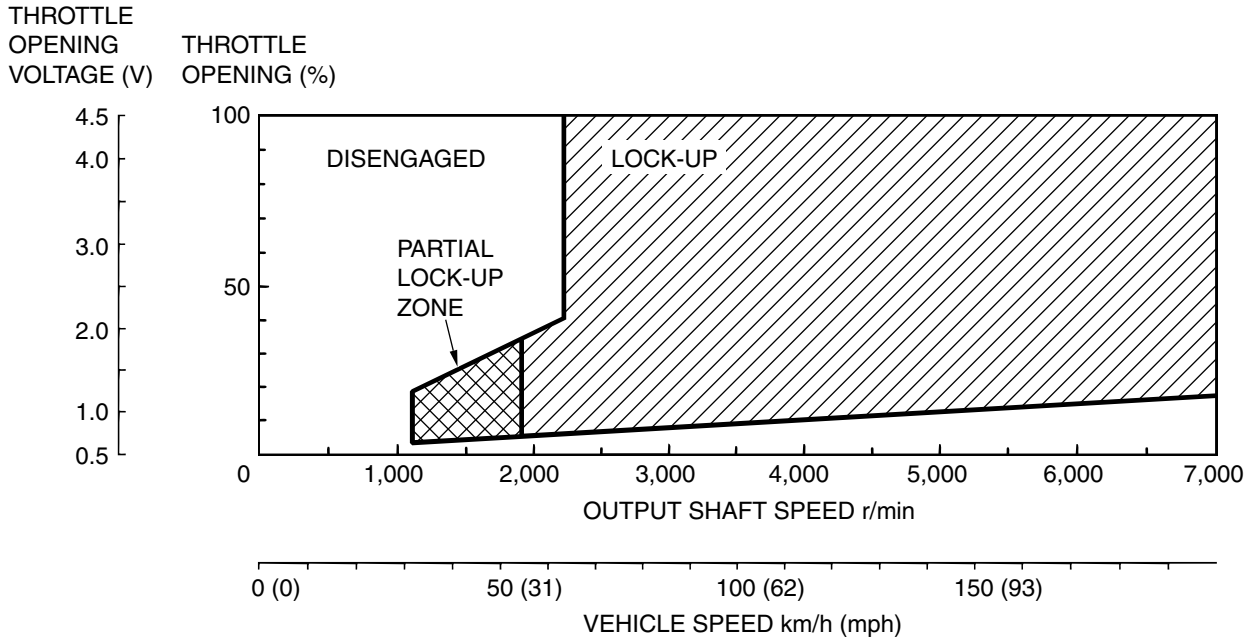
TORQUE CONVERTER CLUTCH CONTROL

4TH GEAR RANGE <F4A4B>



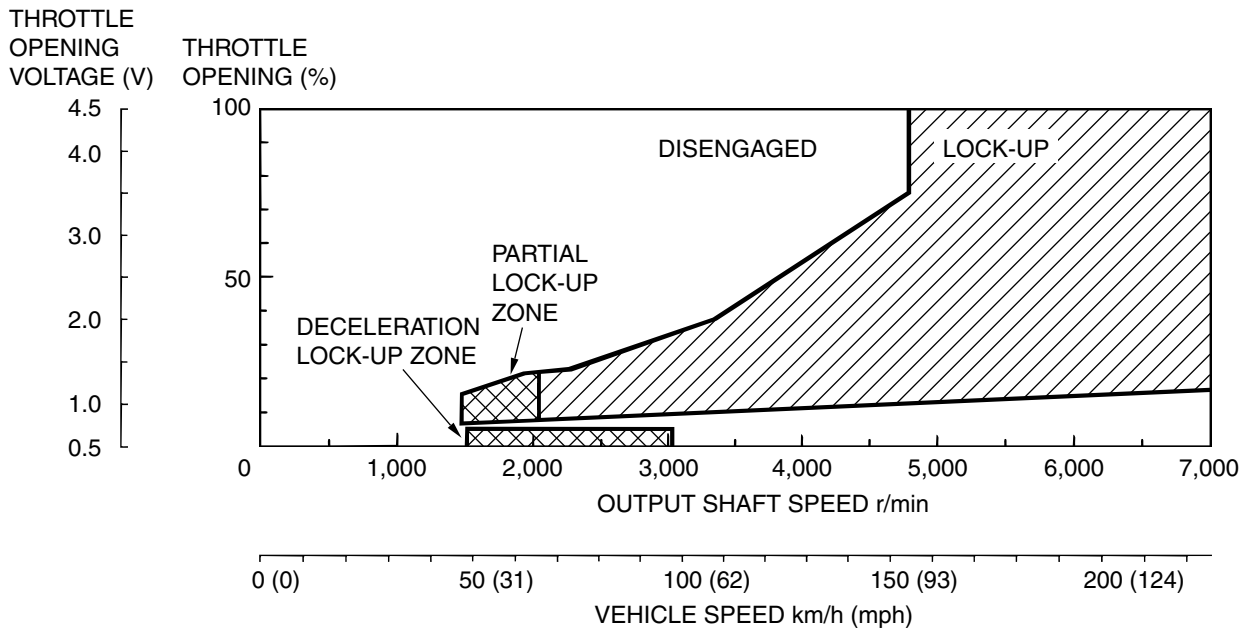
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3RD GEAR RANGE <4A4B>



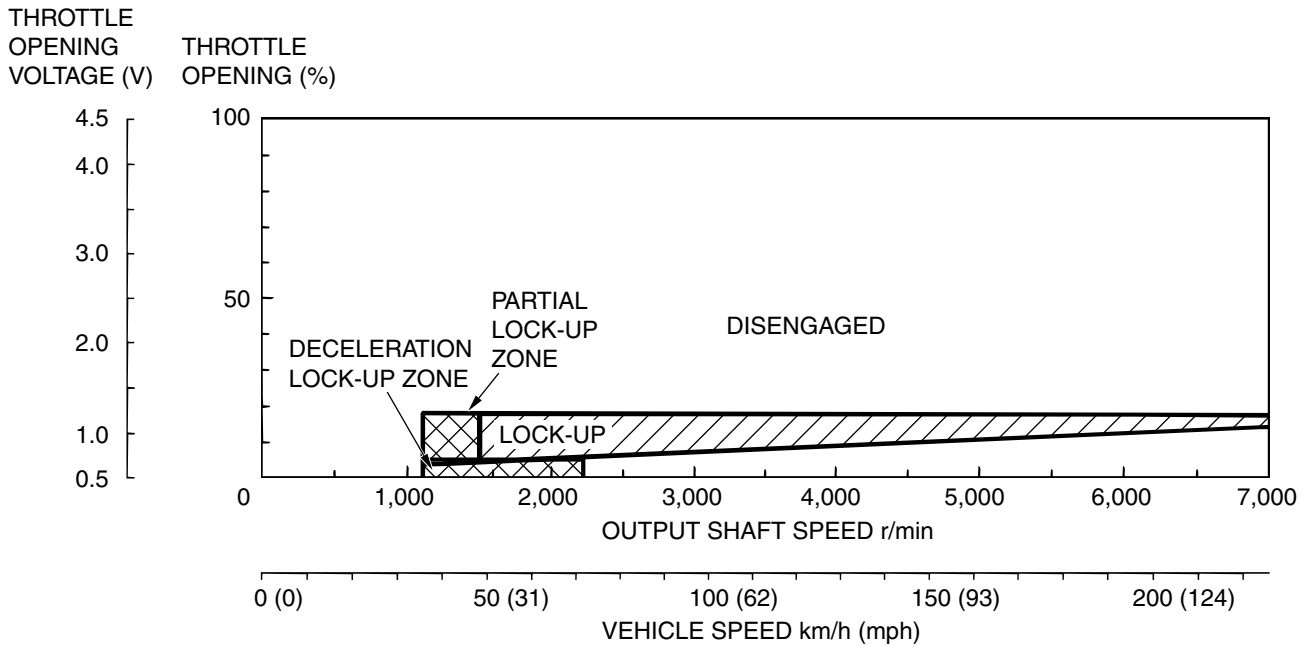
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4TH GEAR RANGE <F4A5A>



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3RD GEAR RANGE <4A5A>

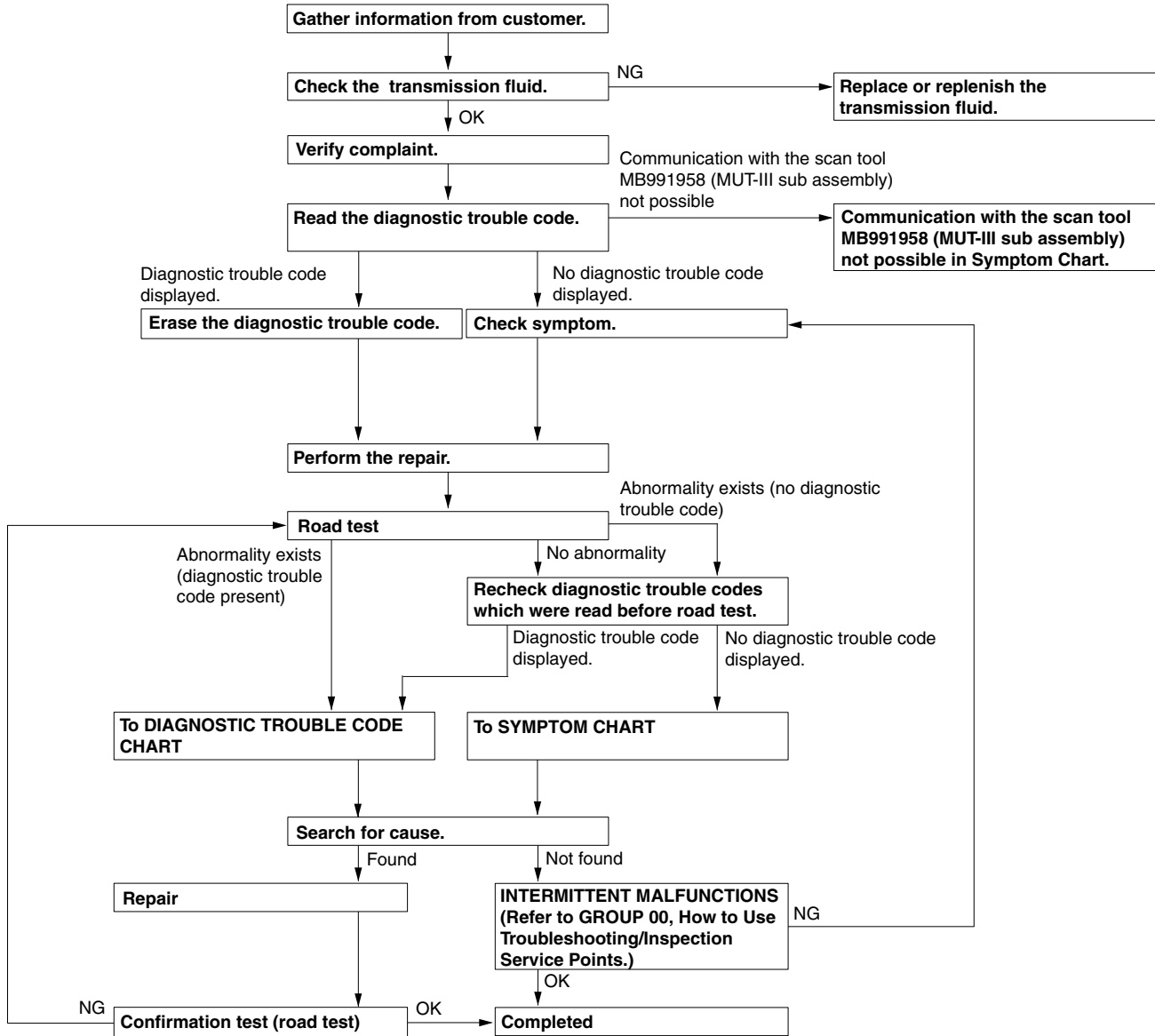


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AUTOMATIC TRANSAXLE DIAGNOSIS

DIAGNOSTIC TROUBLESHOOTING FLOW

M1231013500353



AC210189AB

INTRODUCTION TO A/T DIAGNOSIS

The automatic transaxle can exhibit any of the following symptoms: noise or vibration is generated, Transmission fluid leaks, the vehicle does not move forward or backward. The causes of these symptoms could come from: Incorrect mounting, the Transmission fluid may be low, or a component of the transaxle may be faulty.

M1231012300226

The following items are suspected as causes for the INVECS-II troubles: malfunction of the PCM, the sensors, the switches, the harness or connectors.

A/T DIAGNOSTIC TROUBLESHOOTING STRATEGY

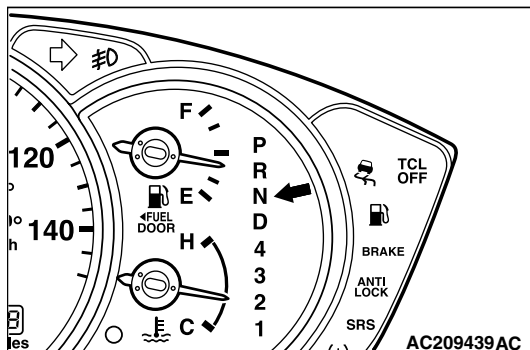
M1231007600339

Use these steps to plan your diagnostic strategy. If you follow them carefully, you will find most A/T malfunctions.

1. Gather as much information as possible about the complaint from the customer.
2. Verify that the condition described by the customer exists.
3. Check the vehicle for any A/T Diagnostic Trouble Codes (DTCs).
4. If you can not verify the condition and there are no DTCs, the malfunction is intermittent. For information on how to cope with intermittent malfunctions, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction [P.00-14](#).
5. If you can verify the condition but there are no DTCs, or the system can not communicate with scan tool, refer to the Symptom Chart [P.23A-44](#).
6. If there is a DTC, record the number of the code, then erase the code from memory using scan tool.
7. Reconfirm the symptom with a Road Test.
8. If a DTC is set again, go to the Inspection Chart for Diagnostic Trouble Codes.
9. If a DTC is not set again, the malfunction is intermittent. For information on how to cope with intermittent malfunctions, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction [P.00-14](#).
10. After repairs are completed, conduct a Road Test duplicating the complaint conditions to confirm the malfunction has been eliminated.

DIAGNOSTIC FUNCTION

M1231022500135



CHECK "N" RANGE LIGHT

The "N" range light flashes once per second if there is an abnormality in any of the items in the table below which are related to the A/T system. Check for diagnostic trouble codes if the "N" range light is flashing once per second.

"N" range light flashing items

- Input shaft speed sensor
- Output shaft speed sensor
- Each solenoid valve
- Gear incorrect ratio
- A/T control relay system

CAUTION

If the "N" range light is flashing, the transmission fluid temperature is high. (It flashes when the fluid is approximately 125°C or more and goes off when the fluid is approximately 115°C or less)

ON-BOARD DIAGNOSTICS

The powertrain control module (PCM) monitors its input/output signals (some signals all the time and others under specified conditions). When an irregular signal is initially monitored, the PCM decides that a malfunction has occurred and records the occurrence as a diagnostic trouble code. There are 21 diagnostic items. The diagnostic results can be read with scan tool. Diagnostic trouble codes are kept in memory by direct battery feed. The codes are

retained in memory even if the ignition switch is in the "LOCK" (OFF) position. DTCs are not erased even after the battery terminals and the PCM connector are disconnected. In addition, the diagnostic trouble code can also be erased by scan tool.

NOTE: If a sensor is disconnected when the ignition switch is in the "ON" position, a diagnostic trouble code is stored in memory. In this case, erase the DTC using scan tool.

The 21 diagnostic items are displayed in numeric order.

HOW TO CONNECT THE SCAN TOOL (MUT-III)**Required Special Tools:**

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A

⚠ CAUTION

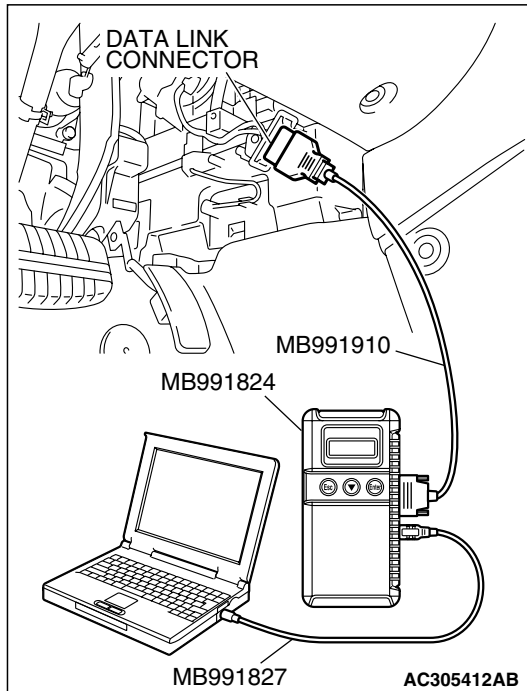
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991910 to special tool MB991824.
5. Connect special tool MB991910 to the data link connector.
6. Turn the power switch of special tool MB991824 to the "ON" position.

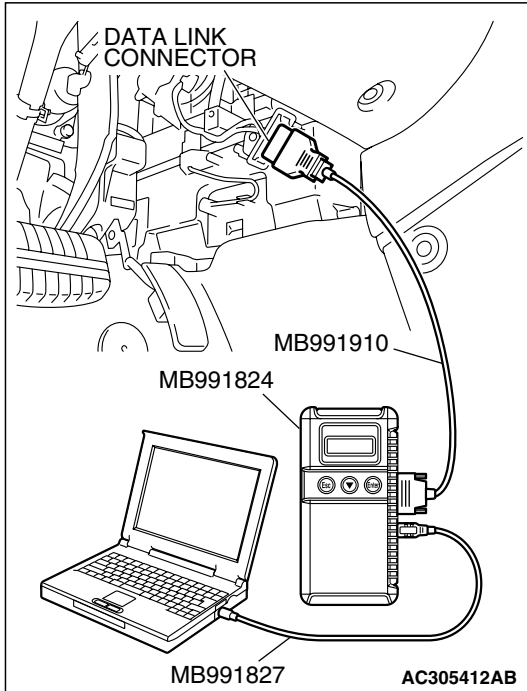
NOTE: When special tool MB991824 is energized, special tool MB991824 indicator light will be illuminated in a green color.

7. Start the MUT-III system on the personal computer.

NOTE: Disconnecting scan tool MB991958 is the reverse of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.

**HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES****Required Special Tools:**

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

NOTE: If the battery voltage is low, diagnostic trouble codes will not be set. Check the battery if scan tool MB991958 does not display.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "Interactive Diagnosis" from the start-up screen.
4. Select "System select."
5. Choose "ELC-A/T" from the "POWER TRAIN" tab.
6. Select "MITSUBISHI."
7. Select "Diagnostic Trouble Code."
8. If a DTC is set, it is shown.
9. Choose "Erase DTCs" to erase the DTC.

HOW TO READ DATA LIST

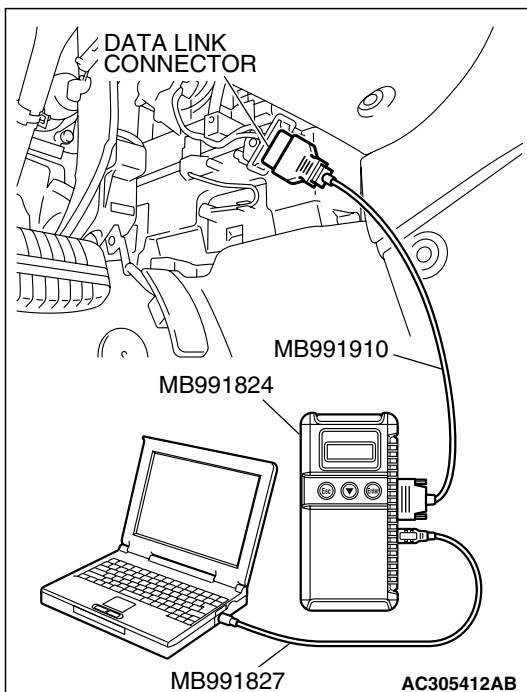
Required Special Tools:

- MB991958 : Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "Interactive Diagnosis" from the start-up screen.
4. Select "System select."
5. Choose "ELC-A/T" from the "POWER TRAIN" tab.
6. Select "MITSUBISHI."
7. Select "Data List."
8. Choose an appropriate item and select the "OK" button.



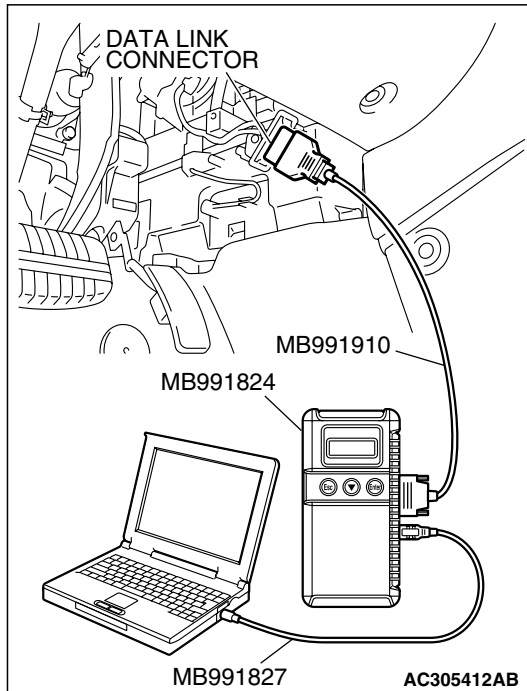
HOW TO PERFORM ACTUATOR TEST**Required Special Tools:**

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A

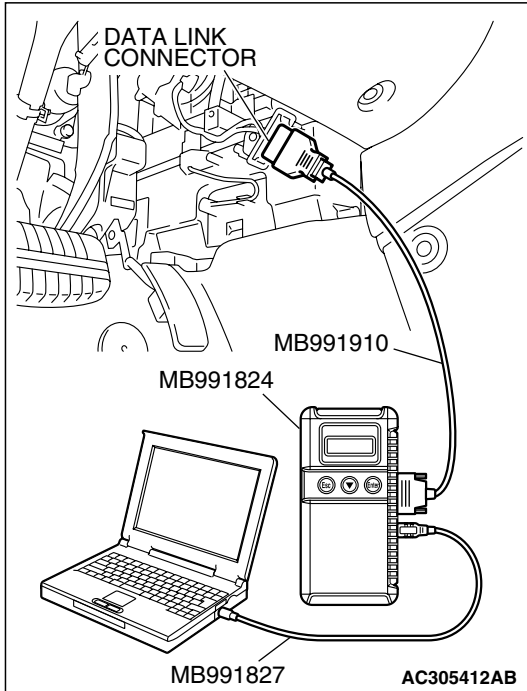
⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "Interactive Diagnosis" from the start-up screen.
4. Select "System select."
5. Choose "ELC-A/T" from the "POWER TRAIN" tab.
6. Select "MITSUBISHI."
7. Select "Actuator Test."
8. Choose an appropriate item and select the "OK" button.

**HOW TO DIAGNOSE THE CAN BUS LINES****Required Special Tools:**

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "CAN bus diagnosis" from the start-up screen.
4. When the vehicle information is displayed, confirm that it matches the vehicle whose CAN bus lines will be diagnosed.
 - If they matches, go to step 8.
 - If not, go to step 5.
5. Select the "view vehicle information" button.
6. Enter the vehicle information and select the "OK" button.
7. When the vehicle information is displayed, confirm again that it matches the vehicle whose CAN bus lines will be diagnosed.
 - If they matches, go to step 8.
 - If not, go to step 5.
8. Select the "OK" button.
9. When the optional equipment screen is displayed, choose the one which the vehicle is fitted with, and then select the "OK" button.

HOW TO INITIALIZE A/T LEARNING VALUE

M1231022600121

AIM

The use of EEPROM has enabled the A/T learned value to be retained even after the battery terminals are disconnected. However, the learned value should be initialized if the A/T assembly, the engine assembly, the valve body assembly or the solenoid valves are replaced. The initialization procedure is as below:

INITIALIZATION PROCEDURE

1. Shift the selector lever to the P range and turn the ignition switch to the LOCK (OFF) position. Then, connect the MUT-III to the diagnosis connector.
2. Initialize the learned value on the initialization screen.
3. After this initialization, make the system learn the idling in accordance with "Learning procedure for idling in MPI engine" (Refer to GROUP 00 – Precautions before Service P.00-26).

FAIL-SAFE/BACKUP FUNCTION

When a malfunction of a main sensor or actuator is detected by the PCM, the transaxle is controlled by pre-set control logic to maintain safe conditions for driving.

The following table shows how the fail-safe/backup function affects vehicle driveability and operation.

| MALFUNCTIONING ITEM | | JUDGEMENT CONDITION | CONTROL DEFAULT DURING MALFUNCTION |
|--|---------|---|---|
| Input shaft speed sensor | | If no output pulse from the input shaft speed sensor is detected for one second or more when the vehicle speed is 30 km/h (19 mph) or greater. | The diagnostic trouble code is recorded when the malfunction occurs during 4 monitoring periods in one drive cycle. When the judgment condition is met, the transaxle holds 3rd gear or 2nd gear, depending on speed, as a fail-safe. |
| Output shaft speed sensor | | The output signal from the output shaft speed sensor is not present for one second or more while the vehicle is driven. | The diagnostic trouble code is recorded when the malfunction occurs during 4 monitoring periods in one drive cycle. When the judgment condition is met, the transaxle holds 3rd gear or 2nd gear, depending on speed, as a fail-safe. |
| Low-reverse solenoid valve | | Solenoid valve resistance is below 2.7 ohms for 0.32 seconds. | The diagnostic trouble code is recorded when the malfunction occurs during 4 monitoring periods in one drive cycle. When the judgment condition is met, the A/T control relay is turned off. The transaxle will only operate in 3rd and reverse gears until the system is repaired. |
| Underdrive solenoid valve | | | |
| Second solenoid valve | | | |
| Overdrive solenoid valve | | | |
| Torque converter clutch solenoid valve | | | |
| Incomplete shifting | 1st | The gear ratio value from the output shaft speed sensor is not the same as the output from the input shaft speed sensor for one second after shifting has been completed. | The diagnostic trouble code is recorded when the malfunction occurs during 4 monitoring periods in one drive cycle. When the judgment condition is met, the A/T control relay is turned off. The transaxle will only operate in 3rd and reverse gears until the system is repaired. |
| | 2nd | | |
| | 3rd | | |
| | 4th | | |
| | Reverse | | |
| A/T control relay | | A/T control relay voltage is less than seven volts for 0.1 second after the ignition switch is turned "ON." | The A/T control relay is switched off. The transaxle will only operate in 3rd and reverse gears until the system is repaired. |
| Malfunction in the PCM | | Malfunction has occurred in the PCM. | The A/T control relay is switched off. The transaxle will only operate in 3rd and reverse gears until the system is repaired. |

ROAD TEST

M1231007800407

Check using the following procedures.

| STEP | CONDITION BEFORE TEST/OPERATION | TEST/OPERATION | STANDARD | INSPECTION ITEM | DTC | INSPECTION PROCEDURE PAGE |
|------|---|---|--|----------------------------------|--------|--|
| 1 | Ignition switch: (LOCK) OFF | Ignition switch (1) ON | Data list No.54 (1) Control Relay Voltage [V] | A/T Control relay output voltage | 54 | A/T Control relay system (P.23A-267). |
| 2 | Ignition switch: ON Engine: Stopped Transmission range: P | Transmission range <Vehicles without sport mode> (1) P, (2) R, (3) N, (4) D, (5) 3, (6) 2, (7) L | Data list No.61 (1) P, (2) R, (3) N, (4) D, (5) 3, (6) 2, (7) L | Transmission range switch | 27, 28 | Transmission range switch system (P.23A-120, P.23A-165). |
| | | Transmission range <Vehicles with sport mode> (1) P, (2) R, (3) N, (4) D | | | | |
| | | Transmission range <Vehicles with sport mode> (1) D (1st gear) (2) Select the sport mode (1st gear) (3) Upshift and hold the selector lever in that position (2nd gear) (4) Downshift and hold the selector lever in that position (1st gear) | Data list No.67 (1) OFF, (2) ON, (3) ON, (4) ON Data list No.68 (1) OFF, (2) OFF, (3) ON, (4) OFF Data list No.69 (1) OFF, (2) OFF, (3) OFF, (4) ON | Select switch and Shift switch | - | Shift switch assembly system (P.23A-316). |
| | | Shift indicator light (1) "D" and "1" illuminates (2) Only "1" illuminates (3) Only "2" illuminates (4) Only "1" illuminates | | | | |

| STEP | CONDITION BEFORE TEST/OPERATION | TEST/OPERATION | STANDARD | INSPECTION ITEM | DTC | INSPECTION PROCEDURE PAGE |
|------|---|---|---|---------------------------------------|--------|--|
| | | Accelerator pedal (1) Fully closed (2) Depressed (3) Fully open | Data list No.11 (1) 300 – 700 mV (2) Gradually rises from (1) (3) 4,000 mV or more | TP sensor | – | Group 13A <2.4L Engine>, Diagnostic Trouble Code Procedures – DTCs P0122, 0123: Throttle Position Sensor System (P.13A-159 , P.13A-169). Group 13B <3.8L Engine>, Diagnostic Trouble Code Procedures – DTCs P0122, 0123: Throttle Position Sensor System (P.13B-162 , P.13B-172). |
| | | Brake pedal (1) Depressed (2) Released | Data list No.26 (1) ON (2) OFF | Stoplight switch | 26 | Stoplight switch system (P.23A-111). |
| 3 | Ignition switch: ST Engine: Stopped | Cranking test with lever in P or N range | Cranking should be possible | Cranking | - | Engine does not crank (P.23A-282). |
| 4 | Engine warming up | Drive for 15 minutes or more so that the transmission fluid temperature becomes 70 – 80°C (158 – 176°F) | Data list No.15 Gradually rises to 70 – 80°C (158 – 176°F) | Transmission fluid temperature sensor | 15, 16 | Transmission fluid temperature sensor system (P.23A-45 , P.23A-59). |
| 5 | Engine: Idling Transmission range: N | Brake pedal (Retest) (1) Depressed (2) Released | Data list No.26 (1) ON (2) OFF | Stoplight switch | 26 | Stoplight switch system (P.23A-111). |

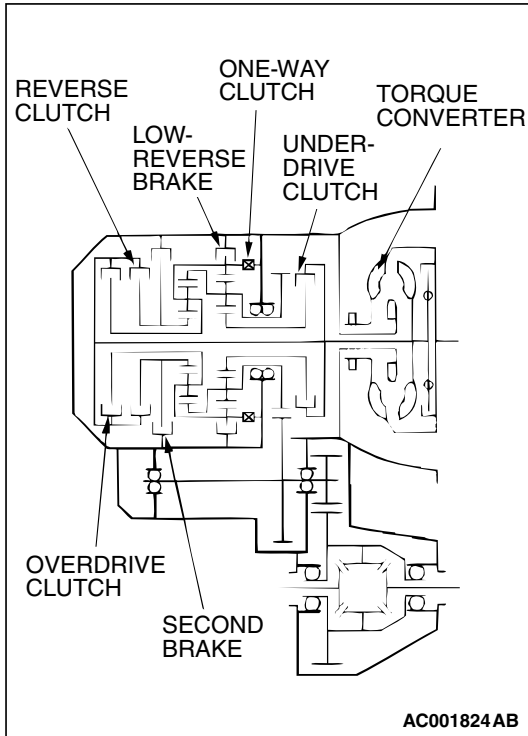
| STEP | CONDITION BEFORE TEST/OPERATION | TEST/OPERATION | STANDARD | INSPECTION ITEM | DTC | INSPECTION PROCEDURE PAGE |
|------|---------------------------------|--|--|----------------------------|---|--|
| | | Accelerator pedal (1) Fully closed (2) Depressed | Data list No.21 (1) Engine tachometer and the scan tool MB991958 (MUT-III sub assembly) shows the same engine speed (2) Gradually rises from (1) | Crankshaft position sensor | 21 | Group 13A <2.4L Engine>, Diagnostic Trouble Code Procedures – DTC P0335: Crank shaft Position Sensor System (P.13A-548). Group 13B <3.8L Engine>, Diagnostic Trouble Code Procedures – DTC P0335: Crank shaft Position Sensor System (P.13B-604). |
| | | Transmission range (1) N → D (2) N → R | Should be no abnormal shift shocks Time delay when engaging should be within 2 seconds | Malfunction when starting | - | Engine stalls when moving selector lever from N to D or N to R (P.23A-291). |
| | - | | | | Shift shock when shifting from N to D and long delay (P.23A-293). | |
| | - | | | | Shift shock when shifting from N to R and long delay (P.23A-296). | |
| | - | | | | Shift shock when shifting from N to D, N to R and long delay (P.23A-299). | |
| | | | | | Does not move | - |
| | | | | | - | Does not move backward (P.23A-287). |

| STEP | CONDITION BEFORE TEST/OPERATION | TEST/OPERATION | STANDARD | INSPECTION ITEM | DTC | INSPECTION PROCEDURE PAGE |
|------|--|---|---|-----------------------------------|---|--|
| | | | | | - | Does not move (forward or backward) (P.23A-290). |
| 6 | Transmission range: N <Vehicles without sport mode>, Sport mode <Vehicles with sport mode> (on a flat and straight road) | Gear range and vehicle speed (Each condition should be maintained for 10 seconds or more). (1) Idling in 1st gear (Vehicle stopped) (2) Driving at constant speed of 10 km/h (6.2 mph) in 1st gear (3) Driving at constant speed of 30 km/h (19 mph) in 2nd gear (4) Driving at constant speed of 50 km/h (31 mph) in 3rd gear (5) Driving at constant speed of 60 km/h (37 mph) in 4th gear | Data list No.63 (2) 1st, (3) 2nd, (4) 3rd, (5) 4th | Shift position | - | - |
| | | | Data list No.31 (2) 0%, (3) 100%, (4) 100%, (5) 100% | Low-reverse solenoid valve duty % | 31 | Low-reverse solenoid valve system (P.23A-187). |
| | | | Data list No.32 (2) 0%, (3) 0%, (4) 0%, (5) 100% | Underdrive solenoid valve duty % | 32 | Underdrive solenoid valve system (P.23A-200). |
| | | | Data list No.33 (2)100%, (3) 0%, (4) 100%, (5) 0% | Second solenoid valve duty % | 33 | Second solenoid valve system (P.23A-211). |
| | | | Data list No.34 (2) 100%, (3) 100%, (4) 0%, (5) 0% | Overdrive solenoid valve duty % | 34 | Overdrive solenoid valve system (P.23A-222). |
| | | Data list No.22 (4) 1,400 – 1,700 r/min | Input shaft speed sensor | 22 | Input shaft speed sensor system (P.23A-69). | |

| STEP | CONDITION BEFORE TEST/OPERATION | TEST/OPERATION | STANDARD | INSPECTION ITEM | DTC | INSPECTION PROCEDURE PAGE |
|------|---|--|--|---|------------|--|
| | | | Data list No.23 (4) 1,400 – 1,700 r/min | Output shaft speed sensor | 23 | Output shaft speed sensor system (P.23A-90). |
| 7 | Transmission range: 3 <Vehicles without sport mode>, sport mode <Vehicles without sport mode> (on a flat and straight road) | Transmission range and vehicle speed (1) Driving at speed of 60 km/h (37 mph) in 3rd gear (2) Driving at constant speed of 60 km/h (37 mph) (3) Release accelerator pedal (Speed under 50 km/h (31 mph)) | Data list No.36 (2) 70 – 99.6% (3) 70 – 99.6% to 0% | Torque converter clutch solenoid valve duty % | 36, 52, 53 | Torque converter clutch solenoid system (P.23A-233, P.23A-258, P.23A-263). |
| | | | Data list No.52 (2) –10 to 10 r/min (3) The value changes from (2) | Torque converter clutch amount of slippage | | |
| 8 | Use the scan tool MB991958 (MUT-III sub assembly) to stop the INVECS-II function Transmission range: D (on a flat and straight road) | (1)Accelerate to 4th gear at a throttle position sensor output of 1.5 V (accelerator opening angle of 25%) (2)Slowly decelerate to a stop (3)Accelerate to 4th gear at a throttle position sensor output of 2.5 V (accelerator opening angle of 50%) | Data list No.11, 23 The shifting points correspond with the scan tool display and the TP sensor voltage (opening angle) and output shaft speed, which are shown in the standard shift pattern | Malfunction when shifting | - | Shift shock and slipping (P.23A-300). |
| | | | | Does not shift according to instructions | - | Early or late shifting in all gears (P.23A-303). |
| | | | | | - | Early or late shifting in some gears (P.23A-305). |
| | | | | Does not shift | - | No diagnostic trouble code (P.23A-307). |

| STEP | CONDITION BEFORE TEST/OPERATION | TEST/OPERATION | STANDARD | INSPECTION ITEM | DTC | INSPECTION PROCEDURE PAGE |
|------|--|---|---|--------------------------------------|-----|--|
| | | | | | 22 | Input shaft speed sensor system (P.23A-69). |
| | | | | | 23 | Output shaft speed sensor system (P.23A-90). |
| 8 | Use the scan tool MB991958 (MUT-III sub assembly) to stop the INVECS-II function Transmission range: D (on a flat and straight road) | (1) Accelerate from 1st gear to 4th gear. (2) While driving at 60 km/h (37 mph) in 4th gear, downshift to 3rd gear (3) While driving at 40 km/h (25 mph) in 3rd gear, downshift to 2nd gear (4) While driving at 20 km/h (12 mph) in 2nd gear, downshift to 1st gear | Data list No.63 (1) 1st → 2nd → 3rd → 4th (2) 4th → 3rd (3) 3rd → 2nd (4) 2nd → 1st | Does not shift from 1 to 2 or 2 to 1 | 31 | Low-reverse solenoid valve system (P.23A-187). |
| | | | | | 33 | Second solenoid valve system (P.23A-211). |
| | | | | | 41 | 1st gear incorrect ratio (P.23A-245). |
| | | | | | 42 | 2nd gear incorrect ratio (P.23A-245). |
| | | | | Does not shift from 2 to 3 or 3 to 2 | 33 | Second solenoid valve system (P.23A-211). |
| | | | | | 34 | Overdrive solenoid valve system (P.23A-222). |
| | | | | | 42 | 2nd gear incorrect ratio (P.23A-245). |
| | | | | | 43 | 3rd gear incorrect ratio (P.23A-245). |

| STEP | CONDITION BEFORE TEST/OPERATION | TEST/OPERATION | STANDARD | INSPECTION ITEM | DTC | INSPECTION PROCEDURE PAGE |
|------|---|--|--|--------------------------------------|-----|---|
| | | | | Does not shift from 3 to 4 or 4 to 3 | 32 | Underdrive solenoid valve system (P.23A-200). |
| | | | | | 33 | Second solenoid valve system (P.23A-211). |
| | | | | | 43 | 3rd gear incorrect ratio (P.23A-245). |
| | | | | | 44 | 4th gear incorrect ratio (P.23A-245). |
| 9 | Transmission range: N (on a flat and straight road) | Monitor data list No.22 and No.23 with the scan tool MB991958 (MUT-III sub assembly) (1) Move selector lever to R range, drive at constant speed of 10 km/h (6.2 mph) | The ratio between data list No.22 and No.23 should be the same as the gear ratio when reversing. | Does not match | 22 | Input shaft speed sensor system (P.23A-69). |
| | | | | | 23 | Output shaft speed sensor system (P.23A-90). |
| | | | | | 46 | Reverse gear incorrect ratio (P.23A-245). |



TORQUE CONVERTER STALL TEST

M1231005400362

This test measures the maximum engine speed when the selector lever is in the "D" or "R" position and the torque converter stalls. This tests the operation of the torque converter, stator and one-way clutch operation, as well as the holding performance of the clutches and brakes in the transaxle.

⚠ WARNING

Do not let anyone stand in front of or behind the vehicle while this test is performed.

1. Check the transmission fluid level and temperature. Check the engine coolant temperature.
 - Transmission fluid level: At the "HOT" mark on the dipstick
 - Transmission fluid temperature: 70 – 80°C (158 – 176°F)
 - Engine coolant temperature: 80 – 100°C (176 – 212°F)

NOTE: Measures transmission fluid temperature with scan tool MB991958 (MUT-III sub assembly).
2. Chock both rear wheels.
3. Connect a tachometer.
4. Apply the parking and service brakes fully.
5. Start the engine.

⚠ CAUTION

- The throttle should not be fully open for any more than five seconds.
 - If you repeat the stall test when the transmission fluid temperature is greater than 80°C (176°F), move the selector lever to the "N" position and let the engine run at approximately 1,000 r/min for at least one minute. Wait until the transmission fluid temperature returns to 80°C (176°F) or less.
6. Move the selector lever to the "D" position. Fully depress the accelerator pedal and read the maximum engine speed.

Standard value: Stall speed: 2,300 – 2,800 r/min
 7. Move the selector lever to the "R" position. Fully depress the accelerator pedal and read the maximum engine speed.

Standard value: Stall speed: 2,300 – 2,800 r/min

TORQUE CONVERTER STALL TEST JUDGMENT RESULTS

1. Stall speed is too high in both "D" and "R" range
 - Malfunction of the torque converter (Slippage on the splines of the torque converter and the input shaft)
 - Low line pressure
 - Low-reverse brake slippage and malfunction of the one-way clutch
2. Stall speed is too high in "D" range only
 - Underdrive clutch slippage
3. Stall speed is too high in "R" range only
 - Reverse clutch slippage

4. Stall speed is too low in both "D" and "R" ranges
 - Malfunction of the torque converter (Slippage of the one-way clutch)
 - Insufficient engine output

HYDRAULIC PRESSURE TESTS

M1231005500392

⚠ CAUTION

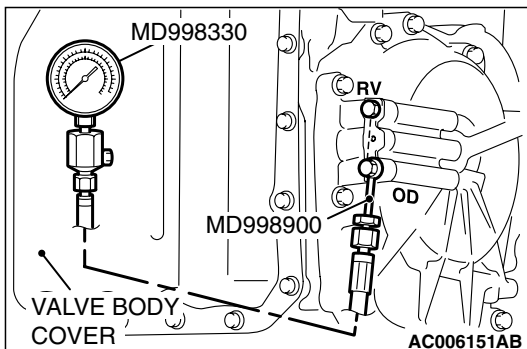
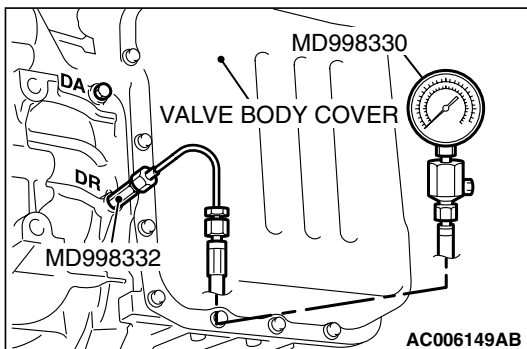
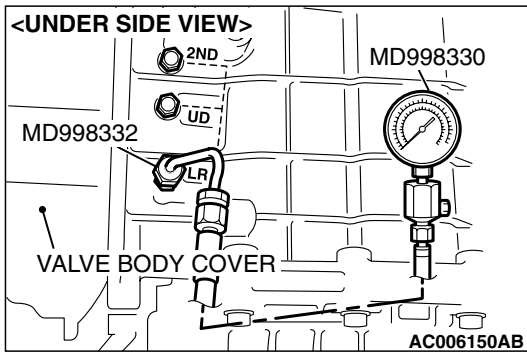
The transmission fluid temperature should be between 70 – 80°C (158 – 176°F) during the test.

1. Check the transmission fluid level and temperature. Check engine coolant temperature.
 - Transmission fluid level: "HOT" mark on the dipstick
 - Transmission fluid temperature: 70 – 80°C (158 – 176°F)
 - Engine coolant temperature: 80 – 100°C (176 – 212°F)
2. Raise the vehicle so that the wheels are free to turn.
3. Connect the special tools (3.0 MPa (427 psi) oil pressure gauge [MD998330] and adapters [MD998332, MD998900]) to each pressure discharge port.

NOTE:

- 2ND: Second brake pressure port
- UD: Underdrive clutch pressure port
- LR: Low-reverse brake pressure port
- DR: Torque converter release pressure port
- DA: Torque converter apply pressure port
- RV: Reverse clutch pressure port
- OD: Overdrive clutch pressure port

4. Restart the engine.
5. Check that there are no leaks around the special tool port adapters.
6. Measure the hydraulic pressure at each port under the conditions given in the standard hydraulic pressure table, and check that the measured values are within the standard value ranges.
7. If the pressure is not within the standard value, stop the engine and refer to the hydraulic pressure test diagnosis table.
8. Remove the O-ring from the port plug and replace it.
9. Remove the special tool, and install the plugs to the hydraulic pressure ports.
10. Start the engine and check that there are no leaks around the plugs.



STANDARD HYDRAULIC PRESSURE TABLE

<F4A4B>

| MEASUREMENT CONDITION | | | STANDARD HYDRAULIC PRESSURE MPa (psi) | | | | | |
|-----------------------|----------------|----------------------|---------------------------------------|------------------------------|--------------------------------|---------------------------------|-----------------------------|--------------------------------|
| TRANS-MISSION RANGE | SHIFT POSITION | ENGINE SPEED (r/min) | UNDERDRIVE CLUTCH PRESSURE [UD] | REVERSE CLUTCH PRESSURE [RV] | OVERDRIVE CLUTCH PRESSURE [OD] | LOW-REVERSE BRAKE PRESSURE [LR] | SECOND BRAKE PRESSURE [2ND] | TORQUE CONVERTER PRESSURE [DR] |
| P | – | 2,500 | – | – | – | 0.26 – 0.36 (37 – 52) | – | 0.22 – 0.36 (32 – 52) |
| R | Reverse | 2,500 | – | 1.27 – 1.77 (185 – 256) | – | 1.27 – 1.77 (185 – 256) | – | 0.50 – 0.73 (73 – 106) |
| N | – | 2,500 | – | – | – | 0.26 – 0.36 (37 – 52) | – | 0.22 – 0.36 (32 – 52) |
| L | 1st gear | 2,500 | 0.98 – 1.05 (142 – 152) | – | – | 0.98 – 1.05 (142 – 152) | – | 0.50 – 0.73 (73 – 106) |
| 2 | 2nd gear | 2,500 | 0.98 – 1.05 (142 – 152) | – | – | – | 0.98 – 1.05 (142 – 152) | 0.50 – 0.73 (73 – 106) |
| 3 | 3rd gear | 2,500 | 0.78 – 0.90 (113 – 131) | – | 0.78 – 0.90 (113 – 131) | – | – | 0.45 – 0.72 (65 – 104) |
| D | 4th gear | 2,500 | – | – | 0.78 – 0.90 (113 – 131) | – | 0.78 – 0.88 (113 – 128) | 0.45 – 0.72 (65 – 104) |

<F4A5A>

| MEASUREMENT CONDITION | | | STANDARD HYDRAULIC PRESSURE MPa (psi) | | | | | |
|-----------------------|----------------|----------------------|---------------------------------------|------------------------------|--------------------------------|---------------------------------|-----------------------------|--------------------------------|
| TRANS-MISSION RANGE | SHIFT POSITION | ENGINE SPEED (r/min) | UNDERDRIVE CLUTCH PRESSURE [UD] | REVERSE CLUTCH PRESSURE [RV] | OVERDRIVE CLUTCH PRESSURE [OD] | LOW-REVERSE BRAKE PRESSURE [LR] | SECOND BRAKE PRESSURE [2ND] | TORQUE CONVERTER PRESSURE [DR] |
| P | – | 2,500 | – | – | – | 0.26 – 0.36 (37 – 52) | – | 0.22 – 0.36 (32 – 52) |
| R | Reverse | 2,500 | – | 1.27 – 1.77 (185 – 256) | – | 1.27 – 1.77 (185 – 256) | – | 0.50 – 0.73 (73 – 106) |
| N | – | 2,500 | – | – | – | 0.26 – 0.36 (37 – 52) | – | 0.22 – 0.36 (32 – 52) |
| Sport mode | 1st gear | 2,500 | 0.98 – 1.05 (142 – 152) | – | – | 0.98 – 1.05 (142 – 152) | – | 0.50 – 0.73 (73 – 106) |
| | 2nd gear | 2,500 | 0.98 – 1.05 (142 – 152) | – | – | – | 0.98 – 1.05 (142 – 152) | 0.50 – 0.73 (73 – 106) |
| | 3rd gear | 2,500 | 0.78 – 0.90 (113 – 131) | – | 0.78 – 0.90 (113 – 131) | – | – | 0.45 – 0.72 (65 – 104) |
| | 4th gear | 2,500 | – | – | 0.78 – 0.90 (113 – 131) | – | 0.78 – 0.88 (113 – 128) | 0.45 – 0.72 (65 – 104) |

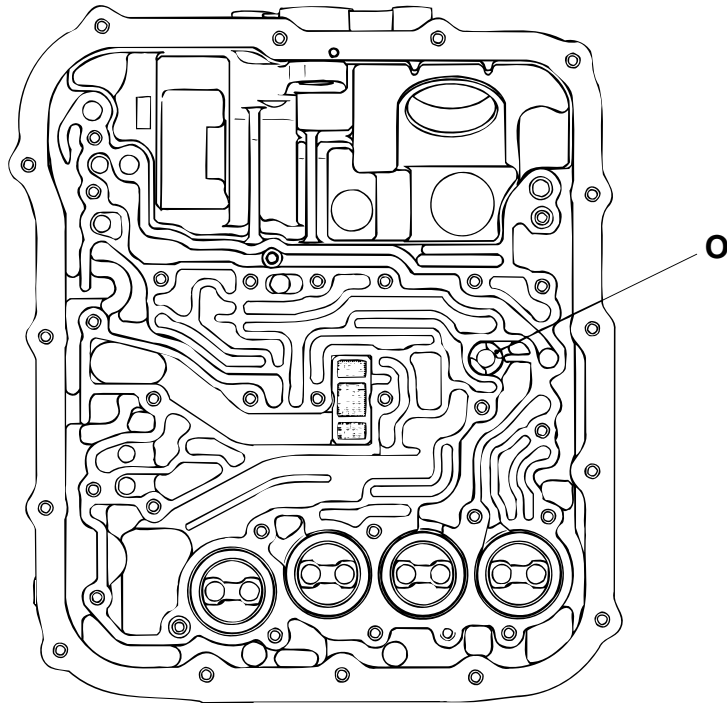
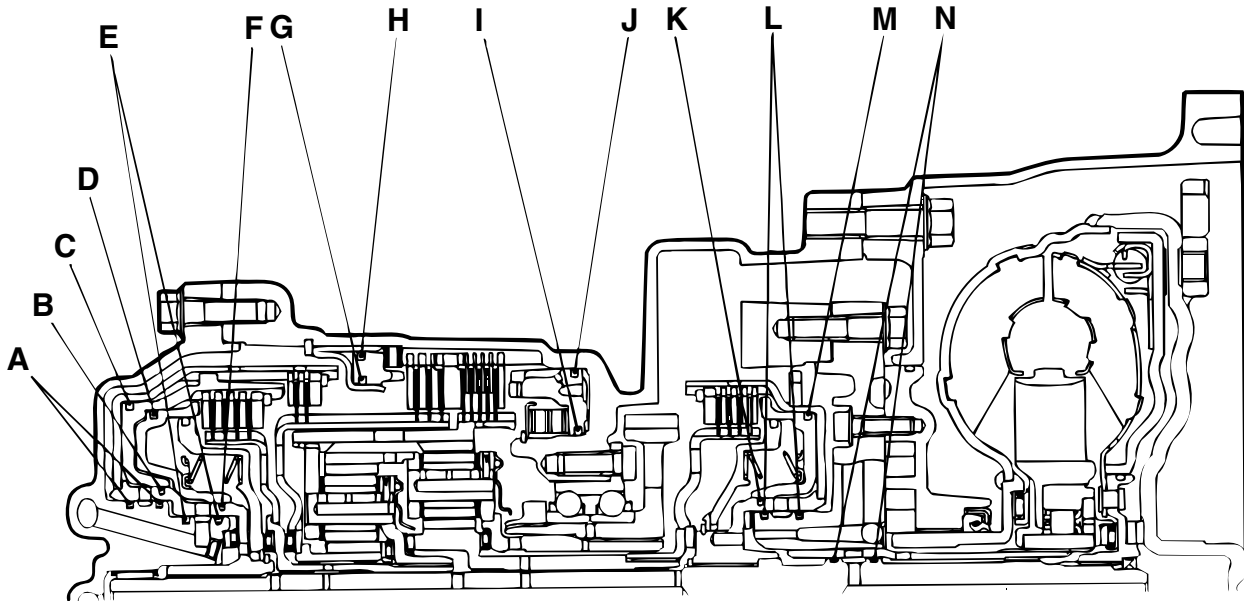
NOTE: When the torque converter pressure is measured, the engine speed should be 1,500 r/min or less.

HYDRAULIC PRESSURE TEST DIAGNOSIS TABLE

| SYMPTOM | PROBABLE CAUSE |
|---|--|
| All hydraulic pressures are high. | Malfunction of the regulator valve |
| All hydraulic pressures are low. | Malfunction of the oil pump |
| | Clogged internal oil filter |
| | Clogged oil cooler |
| | Malfunction of the regulator valve |
| | Malfunction of the relief valve |
| | Incorrect valve body installation |
| | Improperly installed solenoid valves |
| | Damaged solenoid valve O-rings |
| Hydraulic pressure is abnormal in reverse gear only. | Malfunction of the regulator valve |
| | Clogged orifice |
| | Incorrect valve body installation |
| Hydraulic pressure is abnormal in 3rd or 4th gear only. | Malfunction of the overdrive solenoid valve |
| | Malfunction of the overdrive pressure control valve |
| | Malfunction of the regulator valve |
| | Malfunction of the switch valve |
| | Clogged orifice |
| | Incorrect valve body installation |
| Only underdrive clutch hydraulic pressure is abnormal. | Malfunction of the oil seal K |
| | Malfunction of the oil seal L |
| | Malfunction of the oil seal M |
| | Malfunction of the underdrive solenoid valve |
| | Malfunction of the underdrive pressure control valve |
| | Malfunction of the check ball |
| | Clogged orifice |
| | Incorrect valve body installation |
| | Malfunction of the accumulator for underdrive clutch |
| Only reverse clutch hydraulic pressure is abnormal. | Malfunction of the oil seal A |
| | Malfunction of the oil seal B |
| | Malfunction of the oil seal C |
| | Clogged orifice |
| | Incorrect valve body installation |

| SYMPTOM | PROBABLE CAUSE |
|--|--|
| Only overdrive clutch hydraulic pressure is abnormal. | Malfunction of the oil seal D |
| | Malfunction of the oil seal E |
| | Malfunction of the oil seal F |
| | Malfunction of the overdrive solenoid valve |
| | Malfunction of the overdrive pressure control valve |
| | Malfunction of the check ball |
| | Clogged orifice |
| | Incorrect valve body installation |
| | Malfunction of the accumulator for overdrive clutch |
| Only low-reverse brake hydraulic pressure is abnormal. | Malfunction of the oil seal I |
| | Malfunction of the oil seal J |
| | Malfunction of the low-reverse solenoid valve |
| | Malfunction of the low-reverse pressure control valve |
| | Malfunction of the switch valve |
| | Malfunction of the fail safe valve A |
| | Malfunction of all the check balls |
| | Clogged orifice |
| | Incorrect valve body installation |
| Malfunction of the accumulator for low-reverse brake | |
| Only second brake hydraulic pressure is abnormal. | Malfunction of the oil seal G |
| | Malfunction of the oil seal H |
| | Malfunction of the oil seal O |
| | Malfunction of the second solenoid valve |
| | Malfunction of the second pressure control valve |
| | Malfunction of the fail safe valve B |
| | Clogged orifice |
| | Incorrect valve body installation |
| | Malfunction of the accumulator for second brake |
| Only torque converter pressure is abnormal. | Clogged oil cooler |
| | Malfunction of the oil seal N |
| | Malfunction of the torque converter clutch solenoid |
| | Malfunction of the torque converter pressure control valve |
| | Clogged orifice |
| | Incorrect valve body installation |
| Pressure applied to element which should not receive pressure. | Incorrect transaxle control cable adjustment |
| | Malfunction of the manual valve |
| | Malfunction of the check ball |
| | Incorrect valve body installation |

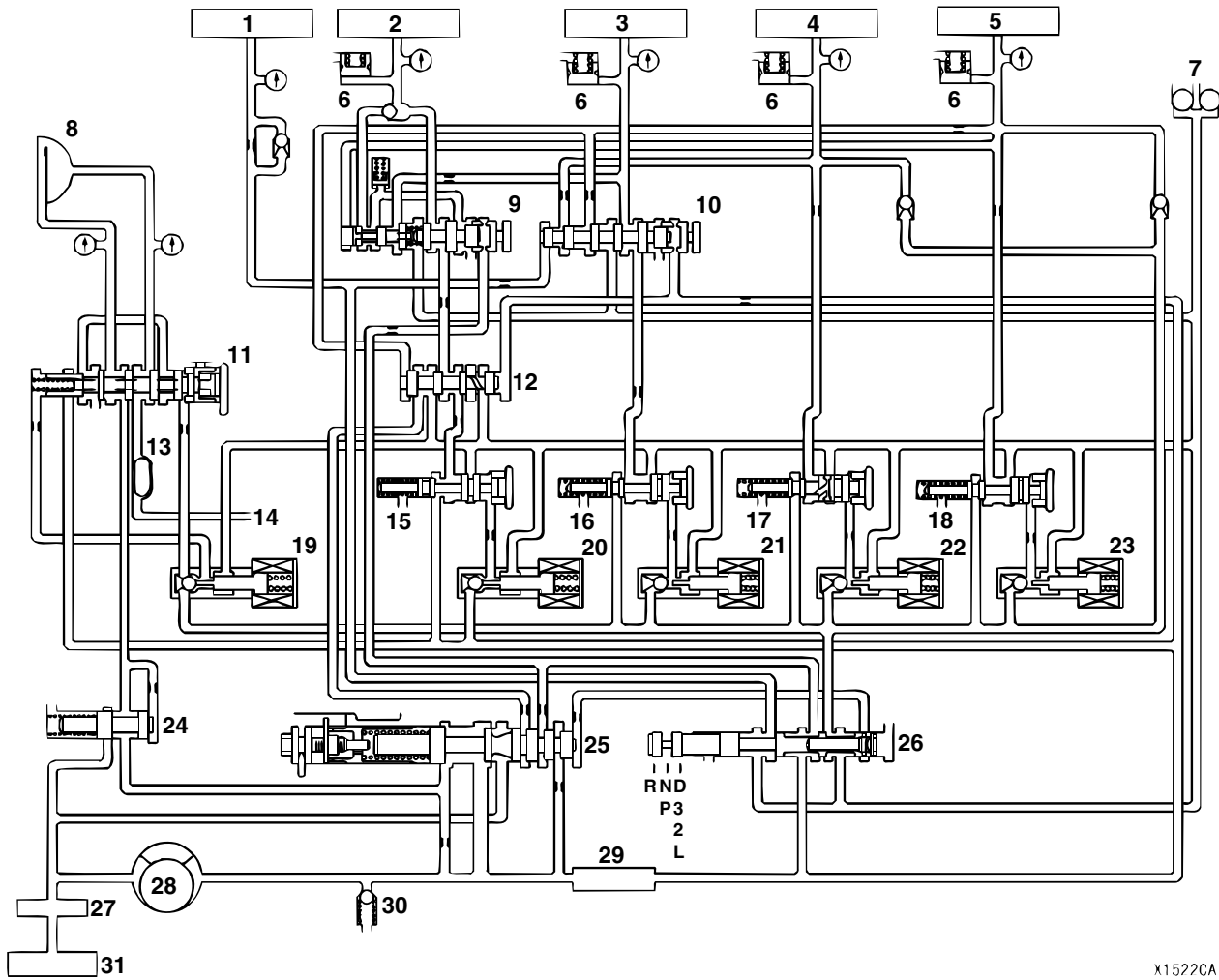
OIL SEAL LAYOUT



AC006152AB

HYDRAULIC CIRCUIT
PARKING AND NEUTRAL

M1231008800336



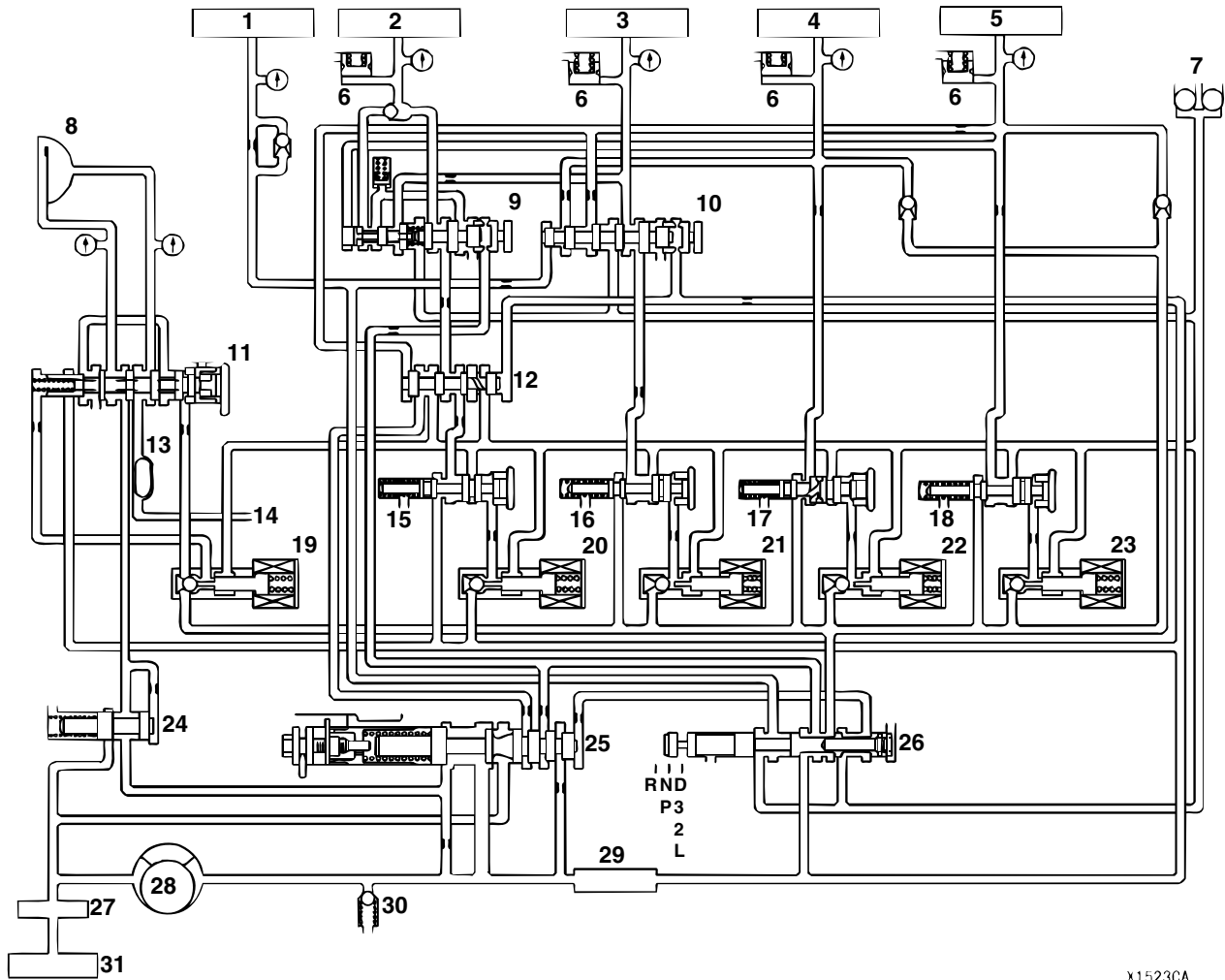
X1522CA

- : LINE PRESSURE
- : OIL PUMP SUCTION PRESSURE
- : TORQUE CONVERTER CLUTCH PRESSURE






- : TORQUE CONVERTER AND LUBRICATION PRESSURE
- : TORQUE CONVERTER CLUTCH SOLENOID VALVE PRESSURE

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| <ul style="list-style-type: none"> 1. REVERSE CLUTCH 2. LOW-REVERSE BRAKE 3. SECOND BRAKE 4. UNDERDRIVE CLUTCH 5. OVERDRIVE CLUTCH 6. ACCUMULATOR 7. CHECK BALL 8. TORQUE CONVERTER CLUTCH 9. FAIL SAFE VALVE A 10. FAIL SAFE VALVE B 11. TORQUE CONVERTER CLUTCH CONTROL VALVE 12. SWITCH VALVE 13. TRANSMISSION FLUID COOLER 14. LUBRICATION 15. LOW-REVERSE PRESSURE CONTROL VALVE 16. SECOND PRESSURE CONTROL VALVE | <ul style="list-style-type: none"> 17. UNDERDRIVE PRESSURE CONTROL VALVE 18. OVERDRIVE PRESSURE CONTROL VALVE 19. TORQUE CONVERTER CLUTCH SOLENOID VALVE 20. LOW-REVERSE SOLENOID VALVE 21. SECOND SOLENOID VALVE 22. UNDERDRIVE SOLENOID VALVE 23. OVERDRIVE SOLENOID VALVE 24. TORQUE CONVERTER PRESSURE CONTROL VALVE 25. REGULATOR VALVE 26. MANUAL VALVE 27. OIL FILTER 28. OIL PUMP 29. OIL STRAINER 30. RELIEF VALVE 31. OIL PAN |
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1ST GEAR

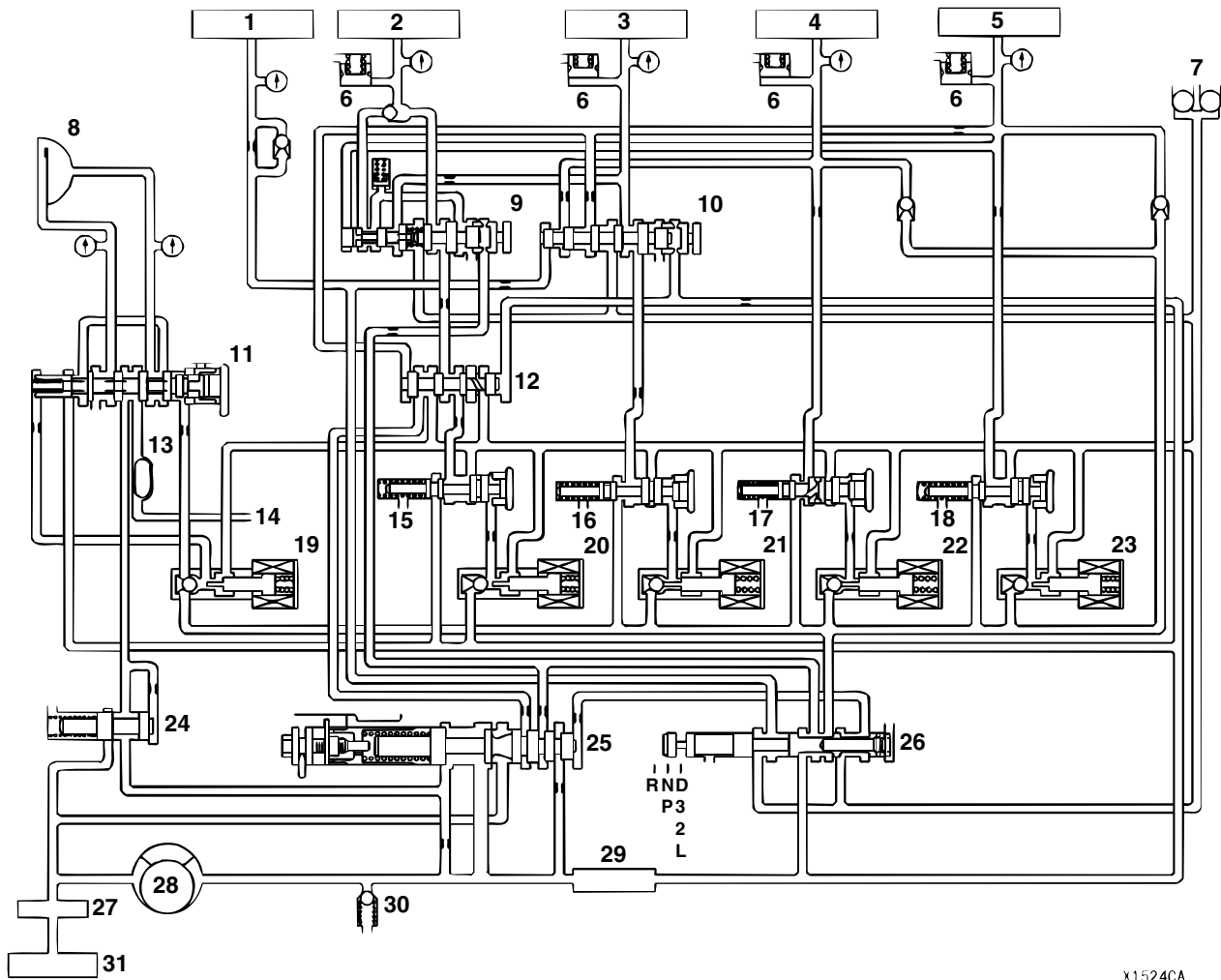


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|  : LINE PRESSURE |  : TORQUE CONVERTER AND LUBRICATION PRESSURE |
|  : OIL PUMP SUCTION PRESSURE |  : TORQUE CONVERTER CLUTCH SOLENOID VALVE PRESSURE |
|  : TORQUE CONVERTER CLUTCH PRESSURE | |

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|---|---|
| 1. REVERSE CLUTCH | 17. UNDERDRIVE PRESSURE CONTROL VALVE |
| 2. LOW-REVERSE BRAKE | 18. OVERDRIVE PRESSURE CONTROL VALVE |
| 3. SECOND BRAKE | 19. TORQUE CONVERTER CLUTCH SOLENOID VALVE |
| 4. UNDERDRIVE CLUTCH | 20. LOW-REVERSE SOLENOID VALVE |
| 5. OVERDRIVE CLUTCH | 21. SECOND SOLENOID VALVE |
| 6. ACCUMULATOR | 22. UNDERDRIVE SOLENOID VALVE |
| 7. CHECK BALL | 23. OVERDRIVE SOLENOID VALVE |
| 8. TORQUE CONVERTER CLUTCH | 24. TORQUE CONVERTER PRESSURE CONTROL VALVE |
| 9. FAIL SAFE VALVE A | 25. REGULATOR VALVE |
| 10. FAIL SAFE VALVE B | 26. MANUAL VALVE |
| 11. TORQUE CONVERTER CLUTCH CONTROL VALVE | 27. OIL FILTER |
| 12. SWITCH VALVE | 28. OIL PUMP |
| 13. TRANSMISSION FLUID COOLER | 29. OIL STRAINER |
| 14. LUBRICATION | 30. RELIEF VALVE |
| 15. LOW-REVERSE PRESSURE CONTROL VALVE | 31. OIL PAN |
| 16. SECOND PRESSURE CONTROL VALVE | |

2ND GEAR



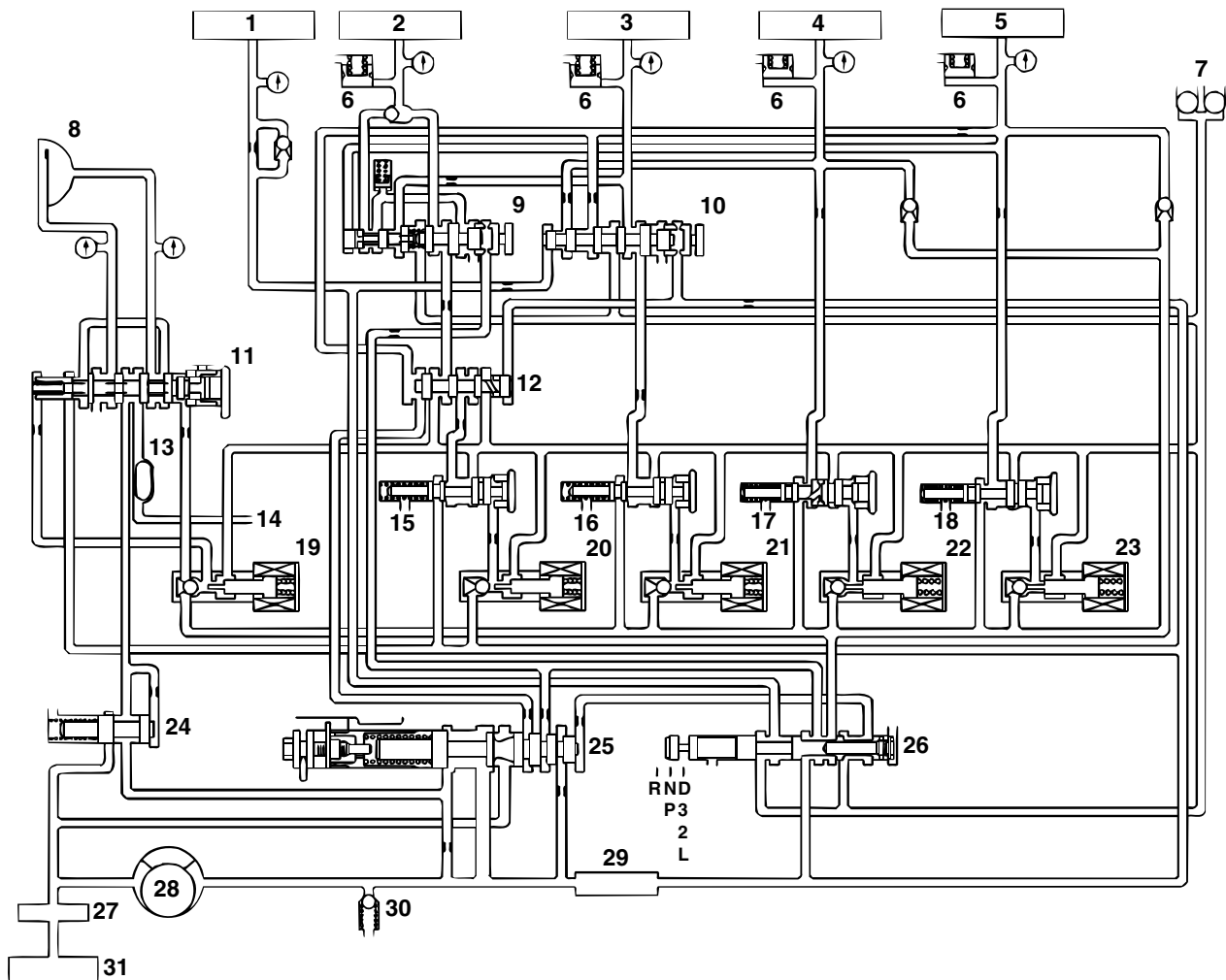
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- : LINE PRESSURE
- : OIL PUMP SUCTION PRESSURE
- : TORQUE CONVERTER CLUTCH PRESSURE






- : TORQUE CONVERTER AND LUBRICATION PRESSURE
- : TORQUE CONVERTER CLUTCH SOLENOID VALVE PRESSURE
- : TORQUE CONVERTER CLUTCH SOLENOID VALVE PRESSURE

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| <ul style="list-style-type: none"> 1. REVERSE CLUTCH 2. LOW-REVERSE BRAKE 3. SECOND BRAKE 4. UNDERDRIVE CLUTCH 5. OVERDRIVE CLUTCH 6. ACCUMULATOR 7. CHECK BALL 8. TORQUE CONVERTER CLUTCH 9. FAIL SAFE VALVE A 10. FAIL SAFE VALVE B 11. TORQUE CONVERTER CLUTCH CONTROL VALVE 12. SWITCH VALVE 13. TRANSMISSION FLUID COOLER 14. LUBRICATION 15. LOW-REVERSE PRESSURE CONTROL VALVE 16. SECOND PRESSURE CONTROL VALVE | <ul style="list-style-type: none"> 17. UNDERDRIVE PRESSURE CONTROL VALVE 18. OVERDRIVE PRESSURE CONTROL VALVE 19. TORQUE CONVERTER CLUTCH SOLENOID VALVE 20. LOW-REVERSE SOLENOID VALVE 21. SECOND SOLENOID VALVE 22. UNDERDRIVE SOLENOID VALVE 23. OVERDRIVE SOLENOID VALVE 24. TORQUE CONVERTER PRESSURE CONTROL VALVE 25. REGULATOR VALVE 26. MANUAL VALVE 27. OIL FILTER 28. OIL PUMP 29. OIL STRAINER 30. RELIEF VALVE 31. OIL PAN |
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3RD GEAR

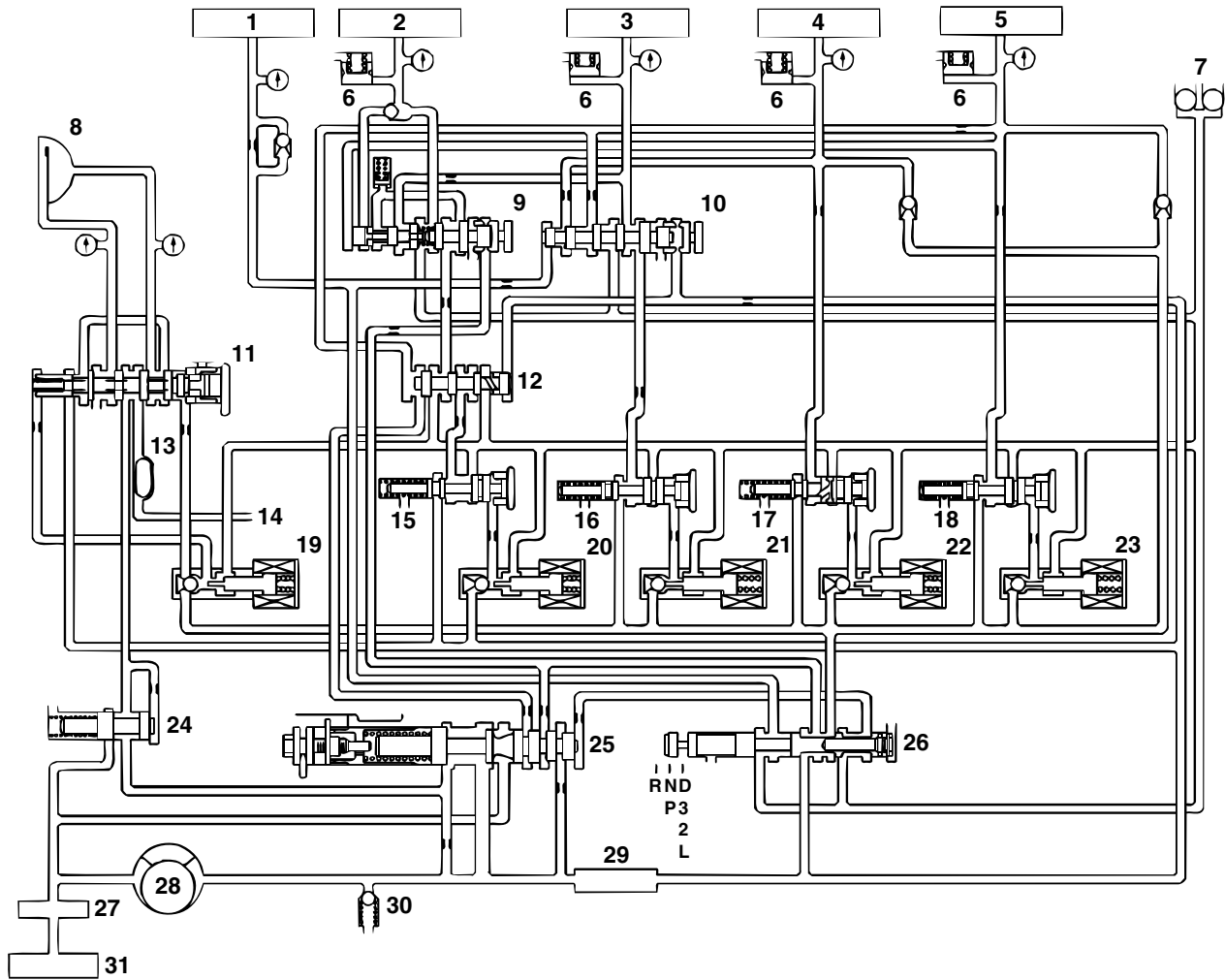







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|--|---|
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|  : OIL PUMP SUCTION PRESSURE |  : TORQUE CONVERTER CLUTCH SOLENOID VALVE PRESSURE |
|  : TORQUE CONVERTER CLUTCH PRESSURE | |

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|---|---|
| 1. REVERSE CLUTCH | 17. UNDERDRIVE PRESSURE CONTROL VALVE |
| 2. LOW-REVERSE BRAKE | 18. OVERDRIVE PRESSURE CONTROL VALVE |
| 3. SECOND BRAKE | 19. TORQUE CONVERTER CLUTCH SOLENOID VALVE |
| 4. UNDERDRIVE CLUTCH | 20. LOW-REVERSE SOLENOID VALVE |
| 5. OVERDRIVE CLUTCH | 21. SECOND SOLENOID VALVE |
| 6. ACCUMULATOR | 22. UNDERDRIVE SOLENOID VALVE |
| 7. CHECK BALL | 23. OVERDRIVE SOLENOID VALVE |
| 8. TORQUE CONVERTER CLUTCH | 24. TORQUE CONVERTER PRESSURE CONTROL VALVE |
| 9. FAIL SAFE VALVE A | 25. REGULATOR VALVE |
| 10. FAIL SAFE VALVE B | 26. MANUAL VALVE |
| 11. TORQUE CONVERTER CLUTCH CONTROL VALVE | 27. OIL FILTER |
| 12. SWITCH VALVE | 28. OIL PUMP |
| 13. TRANSMISSION FLUID COOLER | 29. OIL STRAINER |
| 14. LUBRICATION | 30. RELIEF VALVE |
| 15. LOW-REVERSE PRESSURE CONTROL VALVE | 31. OIL PAN |
| 16. SECOND PRESSURE CONTROL VALVE | |

4TH GEAR

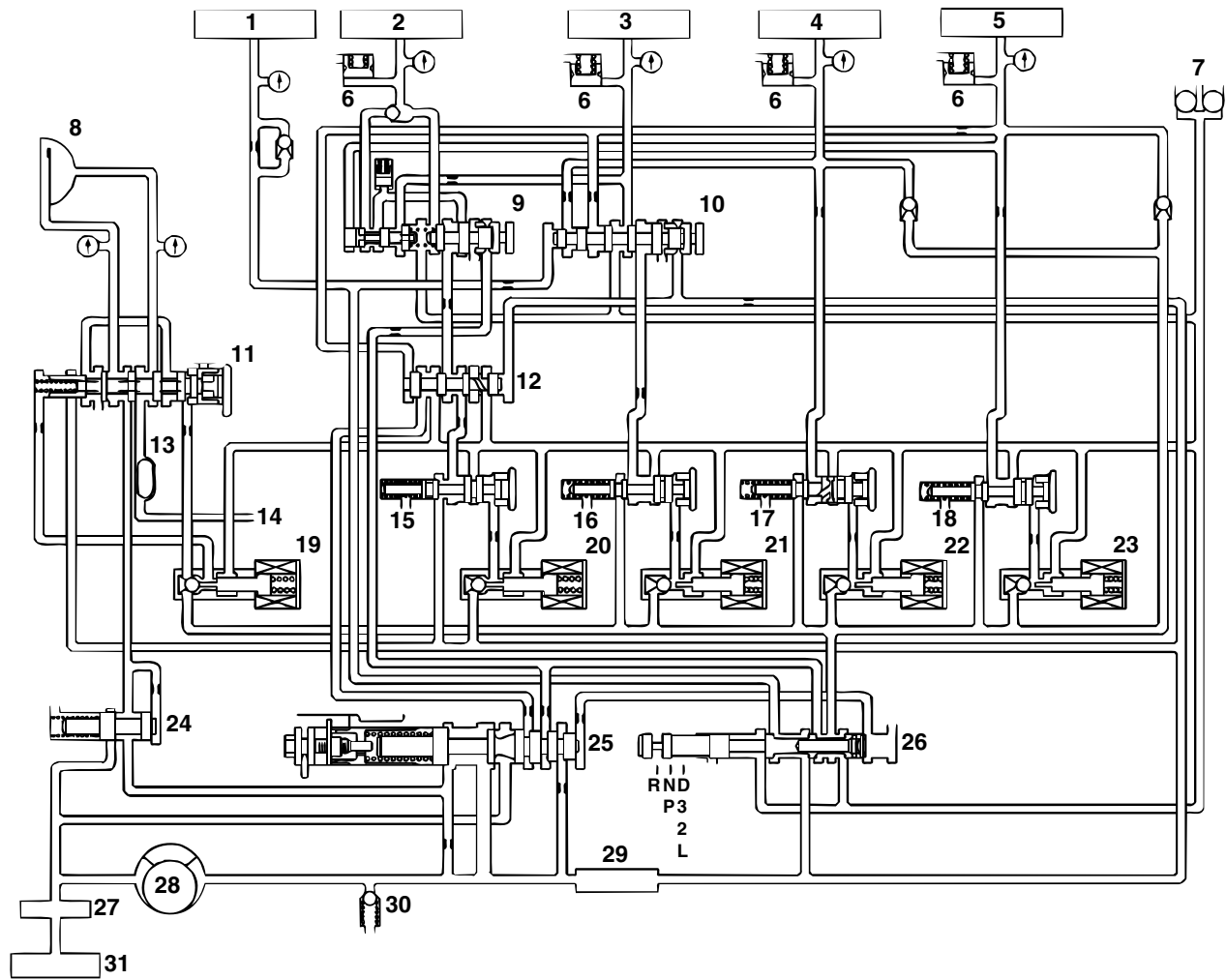


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|--|---|
|  : LINE PRESSURE |  : TORQUE CONVERTER AND LUBRICATION PRESSURE |
|  : OIL PUMP SUCTION PRESSURE |  : TORQUE CONVERTER CLUTCH SOLENOID VALVE PRESSURE |
|  : TORQUE CONVERTER CLUTCH PRESSURE | |

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|---|---|
| 1. REVERSE CLUTCH | 17. UNDERDRIVE PRESSURE CONTROL VALVE |
| 2. LOW-REVERSE BRAKE | 18. OVERDRIVE PRESSURE CONTROL VALVE |
| 3. SECOND BRAKE | 19. TORQUE CONVERTER CLUTCH SOLENOID VALVE |
| 4. UNDERDRIVE CLUTCH | 20. LOW-REVERSE SOLENOID VALVE |
| 5. OVERDRIVE CLUTCH | 21. SECOND SOLENOID VALVE |
| 6. ACCUMULATOR | 22. UNDERDRIVE SOLENOID VALVE |
| 7. CHECK BALL | 23. OVERDRIVE SOLENOID VALVE |
| 8. TORQUE CONVERTER CLUTCH | 24. TORQUE CONVERTER PRESSURE CONTROL VALVE |
| 9. FAIL SAFE VALVE A | 25. REGULATOR VALVE |
| 10. FAIL SAFE VALVE B | 26. MANUAL VALVE |
| 11. TORQUE CONVERTER CLUTCH CONTROL VALVE | 27. OIL FILTER |
| 12. SWITCH VALVE | 28. OIL PUMP |
| 13. TRANSMISSION FLUID COOLER | 29. OIL STRAINER |
| 14. LUBRICATION | 30. RELIEF VALVE |
| 15. LOW-REVERSE PRESSURE CONTROL VALVE | 31. OIL PAN |
| 16. SECOND PRESSURE CONTROL VALVE | |

REVERSE GEAR



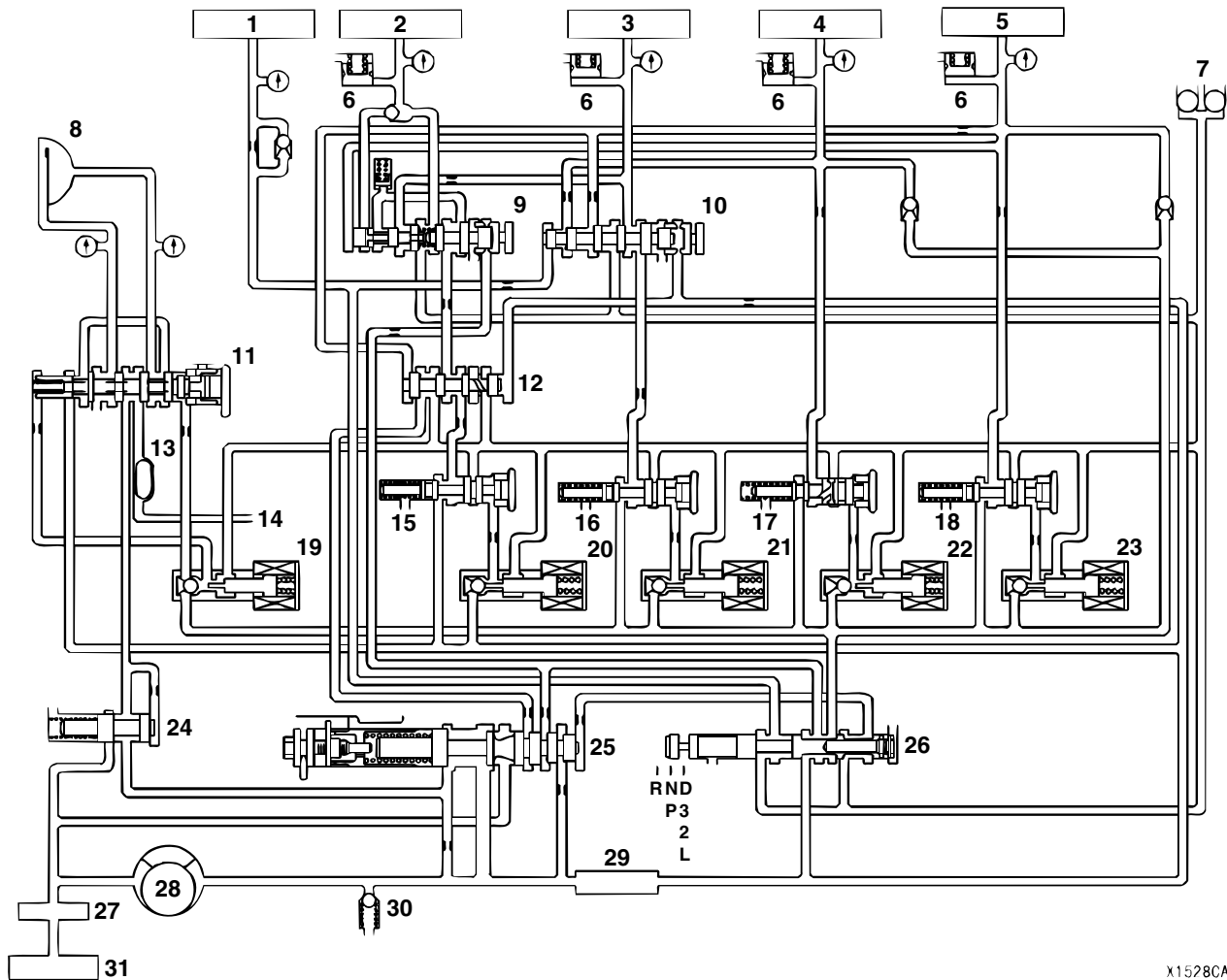
: LINE PRESSURE
 : OIL PUMP SUCTION PRESSURE
 : TORQUE CONVERTER CLUTCH PRESSURE

: TORQUE CONVERTER AND LUBRICATION PRESSURE
 : TORQUE CONVERTER CLUTCH SOLENOID VALVE PRESSURE






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|---|--|
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FAIL-SAFE (IN CASE OF FAIL-SAFE VALVE A OPERATION)

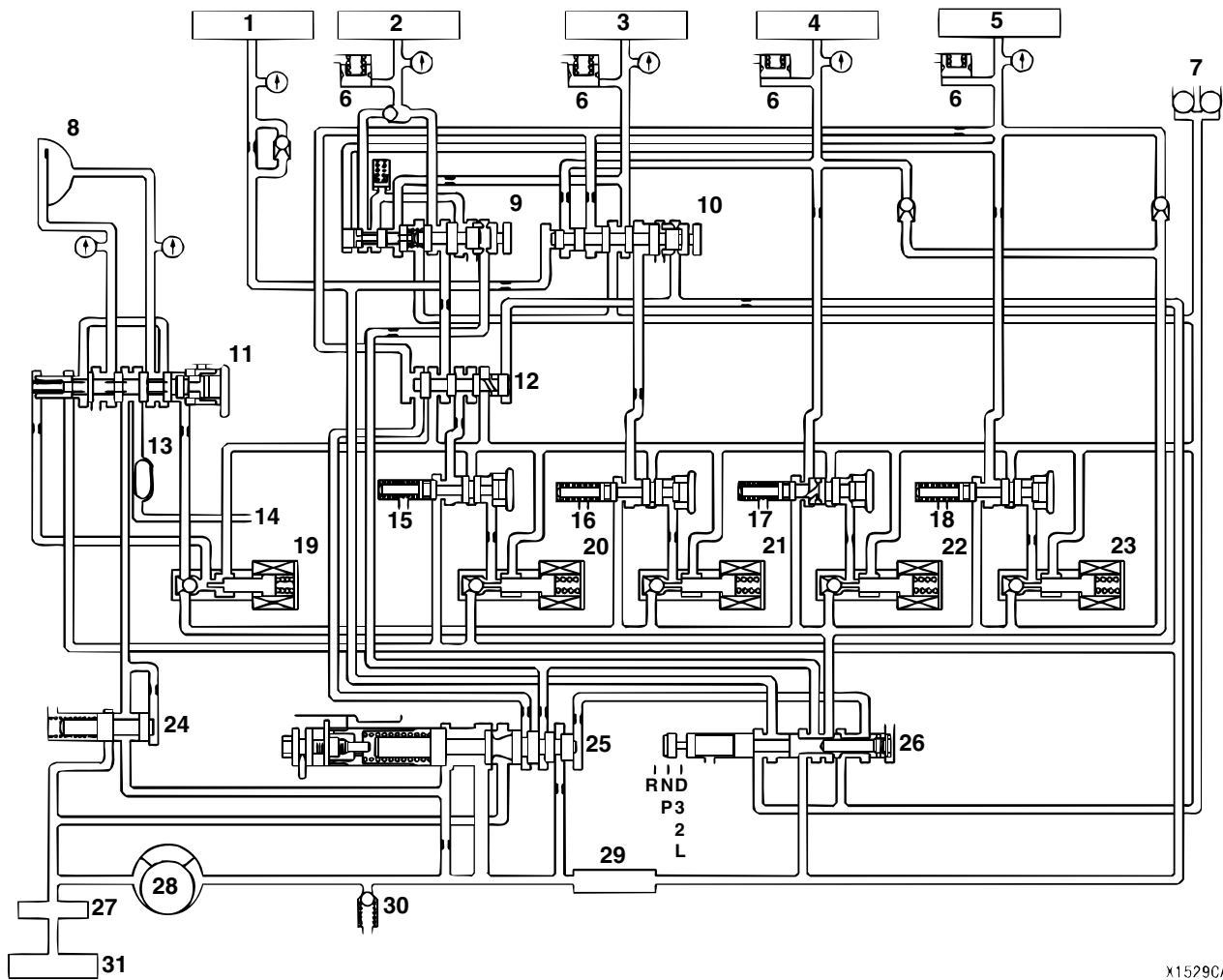


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


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|--|---|
|  : LINE PRESSURE |  : TORQUE CONVERTER AND LUBRICATION PRESSURE |
|  : OIL PUMP SUCTION PRESSURE |  : TORQUE CONVERTER CLUTCH SOLENOID VALVE PRESSURE |
|  : TORQUE CONVERTER CLUTCH PRESSURE | |

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| 1. REVERSE CLUTCH | 17. UNDERDRIVE PRESSURE CONTROL VALVE |
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| 4. UNDERDRIVE CLUTCH | 20. LOW-REVERSE SOLENOID VALVE |
| 5. OVERDRIVE CLUTCH | 21. SECOND SOLENOID VALVE |
| 6. ACCUMULATOR | 22. UNDERDRIVE SOLENOID VALVE |
| 7. CHECK BALL | 23. OVERDRIVE SOLENOID VALVE |
| 8. TORQUE CONVERTER CLUTCH | 24. TORQUE CONVERTER PRESSURE CONTROL VALVE |
| 9. FAIL SAFE VALVE A | 25. REGULATOR VALVE |
| 10. FAIL SAFE VALVE B | 26. MANUAL VALVE |
| 11. TORQUE CONVERTER CLUTCH CONTROL VALVE | 27. OIL FILTER |
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| 13. TRANSMISSION FLUID COOLER | 29. OIL STRAINER |
| 14. LUBRICATION | 30. RELIEF VALVE |
| 15. LOW-REVERSE PRESSURE CONTROL VALVE | 31. OIL PAN |
| 16. SECOND PRESSURE CONTROL VALVE | |

FAIL-SAFE (IN CASE OF FAIL-SAFE VALVE B OPERATION)



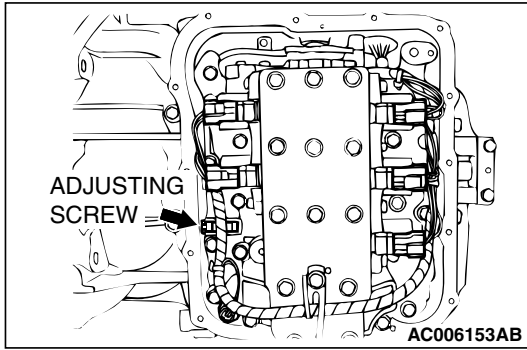
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|--|---|
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|  : OIL PUMP SUCTION PRESSURE |  : TORQUE CONVERTER CLUTCH SOLENOID VALVE PRESSURE |
|  : TORQUE CONVERTER CLUTCH PRESSURE | |

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|---|---|
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| 4. UNDERDRIVE CLUTCH | 20. LOW-REVERSE SOLENOID VALVE |
| 5. OVERDRIVE CLUTCH | 21. SECOND SOLENOID VALVE |
| 6. ACCUMULATOR | 22. UNDERDRIVE SOLENOID VALVE |
| 7. CHECK BALL | 23. OVERDRIVE SOLENOID VALVE |
| 8. TORQUE CONVERTER CLUTCH | 24. TORQUE CONVERTER PRESSURE CONTROL VALVE |
| 9. FAIL SAFE VALVE A | 25. REGULATOR VALVE |
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| 11. TORQUE CONVERTER CLUTCH CONTROL VALVE | 27. OIL FILTER |
| 12. SWITCH VALVE | 28. OIL PUMP |
| 13. TRANSMISSION FLUID COOLER | 29. OIL STRAINER |
| 14. LUBRICATION | 30. RELIEF VALVE |
| 15. LOW-REVERSE PRESSURE CONTROL VALVE | 31. OIL PAN |
| 16. SECOND PRESSURE CONTROL VALVE | |

LINE PRESSURE ADJUSTMENT

M1231001700361



1. Drain the transmission fluid.
NOTE: The hydraulic pressure test must be performed before attempting any adjustments.
2. Remove the valve body cover.
3. Turn the adjusting screw shown in the illustration to adjust the line pressure to the standard value. The pressure increases when the screw is turned counterclockwise.
NOTE: When adjusting the line pressure, adjust to the middle of the standard value range.
Standard value: 0.98 – 1.05 MPa (142 – 152 psi)
4. Install the valve body cover. Pour in one quart transmission fluid.
5. Repeat the hydraulic pressure test. (Refer to [P.23A-29](#)).
Readjust the line pressure if necessary.

DIAGNOSTIC TROUBLE CODE CHART

M1231007900330

CAUTION

During diagnosis, a DTC code associated with other system may be set when the ignition switch is turned on with connector(s) disconnected. On completion, confirm all systems for DTC code(s). If DTC code(s) are set, erase them all.

| A/T DTC NO. | MFI DTC NO. | DIAGNOSIS ITEM | REFERENCE PAGE |
|-------------|-------------|--|--|
| 15 | P0713 | Transmission fluid temperature sensor system | Open circuit P.23A-45 |
| 16 | P0712 | | Short circuit P.23A-59 |
| 21 | – | Crankshaft position sensor system | Open circuit Group 13A <2.4L Engine>, Diagnostic Trouble code Procedures P.13A-548 (P0335 – Crankshaft Position Sensor Circuit) Group 13B <3.8L Engine>, Diagnostic Trouble code Procedures P.13B-604 (P0335 – Crankshaft Position Sensor Circuit) |
| 22 | P0715 | | Input shaft speed sensor system |
| 23 | P0720 | Output shaft speed sensor system | Short circuit/open circuit P.23A-90 |

| A/T DTC NO. | MFI DTC NO. | DIAGNOSIS ITEM | | REFERENCE PAGE |
|--------------------|--------------------|---|--------------------------------------|---------------------------|
| 26 | – | Stoplight switch system | Short circuit | P.23A-111 |
| 27 | P0705 | Transmission range switch system | Open circuit | P.23A-120 |
| 28 | | | Short circuit | P.23A-165 |
| 31 | P0753 | Low-reverse solenoid valve system | Short circuit/open circuit | P.23A-187 |
| 32 | P0758 | Underdrive solenoid valve system | Short circuit/open circuit | P.23A-200 |
| 33 | P0763 | Second solenoid valve system | Short circuit/open circuit | P.23A-211 |
| 34 | P0768 | Overdrive solenoid valve system | Short circuit/open circuit | P.23A-222 |
| 36 | P0743 | Torque converter clutch solenoid valve system | Short circuit/open circuit | P.23A-233 |
| 41 | P0731 | 1st gear incorrect ratio | | P.23A-245 |
| 42 | P0732 | 2nd gear incorrect ratio | | P.23A-245 |
| 43 | P0733 | 3rd gear incorrect ratio | | P.23A-245 |
| 44 | P0734 | 4th gear incorrect ratio | | P.23A-245 |
| 46 | P0736 | Reverse gear incorrect ratio | | P.23A-245 |
| 52 | P0741 | Torque converter clutch system | Defective system | P.23A-258 |
| 53 | P0742 | | Clutch stuck on | P.23A-263 |
| 54 | P1751 | A/T control relay system | Short circuit to ground/open circuit | P.23A-267 |

NOTE: The MFI diagnostic trouble codes are the codes which are set when item "MFI" is selected on scan tool MB991958 (MUT-III sub assembly). However, the codes above indicate failure in the automatic transmission.

SYMPTOM CHART

⚠ CAUTION

During diagnosis, a DTC code associated with other system may be set when the ignition switch is turned on with connector(s) disconnected. On completion, confirm all systems for DTC code(s). If DTC code(s) are set, erase them all.

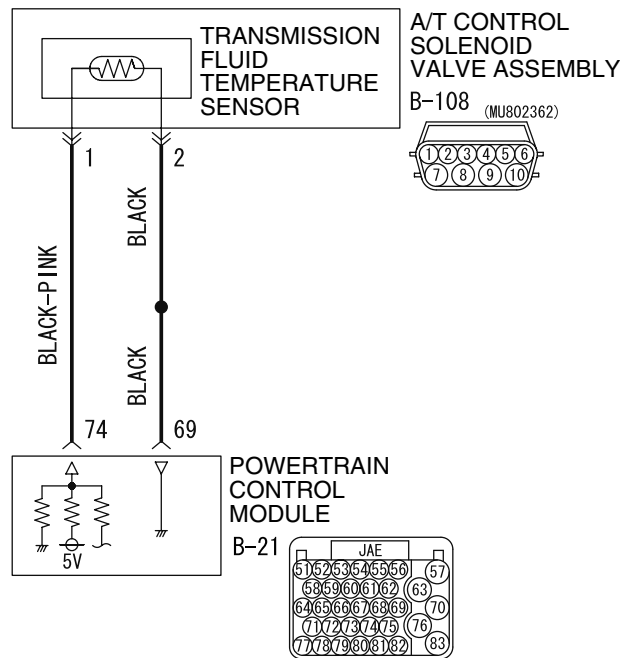
| SYMPTOM | | INSPECTION PROCEDURE NO. | REFERENCE PAGE |
|--|---|--------------------------|---|
| Communication with scan tool is not possible | Communication with all systems is impossible | - | Group 13A <2.4L Engine>, Symptom Procedures P. 13A-967. Group 13B <3.8L Engine>, Symptom Procedures P. 13B-1013. |
| | Communication with the PCM only is impossible | - | Group 13A <2.4L Engine>, Symptom Procedures P. 13A-970. Group 13B <3.8L Engine>, Symptom Procedures P. 13B-1016. |
| Driving impossible | Engine does not start | 1 | P. 23A-282 |
| | Does not move forward | 2 | P. 23A-285 |
| | Does not move backward | 3 | P. 23A-287 |
| | Does not move (forward and backward) | 4 | P. 23A-290 |
| Malfunction when moving selector into gear | Engine stalls when moving selector lever from "N" to "D" or "N" to "R" | 5 | P. 23A-291 |
| | Shift shock when shifting from "N" to "D" and long delay | 6 | P. 23A-293 |
| | Shift shock when shifting from "N" to "R" and long delay | 7 | P. 23A-296 |
| | Shift shock when shifting from "N" to "D" and "N" to "R" and long delay | 8 | P. 23A-299 |
| Malfunction when shifting | Shift shock and slipping | 9 | P. 23A-300 |
| Does not shift properly | Early or late shifting in all gears | 10 | P. 23A-303 |
| | Early or late shifting in some gears | 11 | P. 23A-305 |
| Does not shift | No diagnostic trouble codes | 12 | P. 23A-307 |

| SYMPTOM | | INSPECTION PROCEDURE NO. | REFERENCE PAGE |
|--|-------------------|--------------------------|----------------|
| Malfunction while driving | Poor acceleration | 13 | P.23A-312 |
| | Vibration | 14 | P.23A-314 |
| Shift switch assembly system | | 15 | P.23A-316 |
| Shift position indicator light system <Vehicles with sport mode> | | 16 | P.23A-339 |

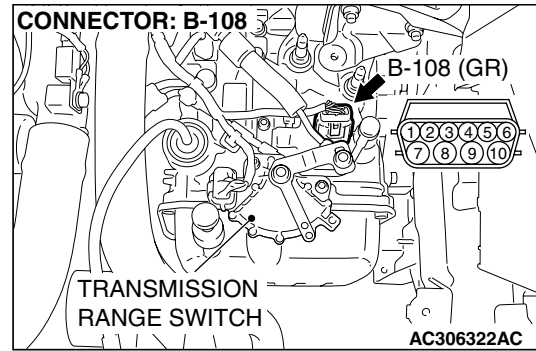
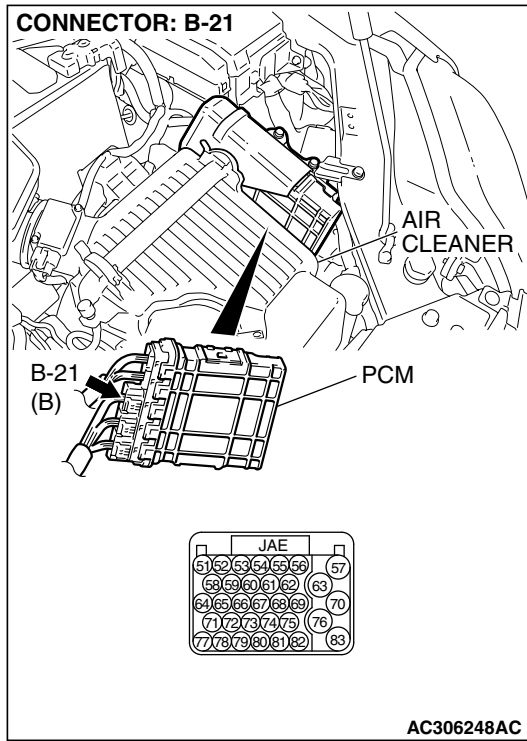
DIAGNOSTIC TROUBLE CODE PROCEDURES

DTC 15 (P0713): Transmission Fluid Temperature Sensor System (Open Circuit)

Transmission Fluid Temperature Sensor System Circuit



W4P06M00AA
AC209753AC



CIRCUIT OPERATION

- The PCM (terminal 74) applies 5 volts to the transmission fluid temperature sensor output terminal (terminal 1).
- The transmission fluid temperature sensor circuit is grounded to the PCM (terminal 69).
- When the transmission fluid temperature is cold, the transmission fluid temperature sensor resistance is high. When the transmission fluid temperature is hot, the transmission fluid temperature sensor resistance is low.

DESCRIPTIONS OF MONITOR METHODS

- If transmission fluid temperature is below specified value even after driving test for more than specified period, PCM judges that transmission fluid temperature sensor has a failure.

MONITOR EXECUTION

- Continuous

MONITOR EXECUTION CONDITIONS (OTHER MONITOR AND SENSOR)

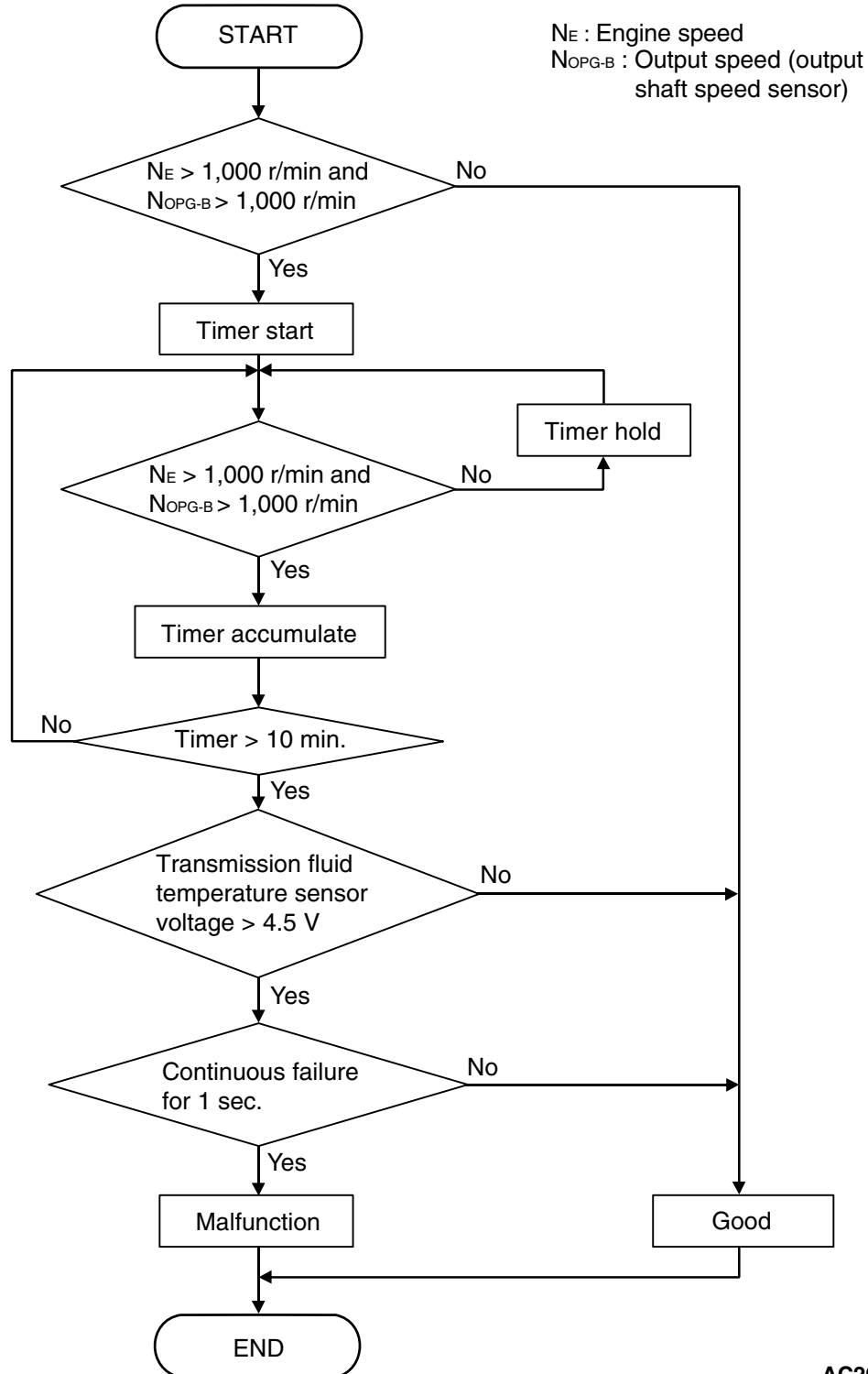
Other Monitor (There is no temporary DTC stored in memory for the item monitored below)

- DTC 23 (P0720): Output shaft speed sensor malfunction

Sensor (The sensor below is determined to be normal)

- Output shaft speed sensor

LOGIC FLOW CHARTS (Monitor Sequence)



AC205204

DTC SET CONDITIONS

Check Conditions

- Engine speed: 1,000 r/min or more.
- Output speed: 1,000 r/min or more.
- Accumulated time in above condition: 10 minutes.

Judgement Criteria

- Transmission fluid temperature sensor voltage: 4.5 volts or more. (1 second)

OBD-II DRIVE CYCLE PATTERN

Start the engine, drive at 60 km/h (37 mph) or more for 15 minutes in total.

TROUBLESHOOTING HINTS (THE MOST LIKELY CAUSES FOR THIS CODE TO BE SET ARE:)

- Malfunction of the transmission fluid temperature sensor circuit
- Damaged harness or connector
- Malfunction of the PCM

DIAGNOSIS**Required Special Tool:**

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A

STEP 1. Using scan tool MB991958, check data list item 15: Transmission Fluid Temperature Sensor.

⚠ CAUTION

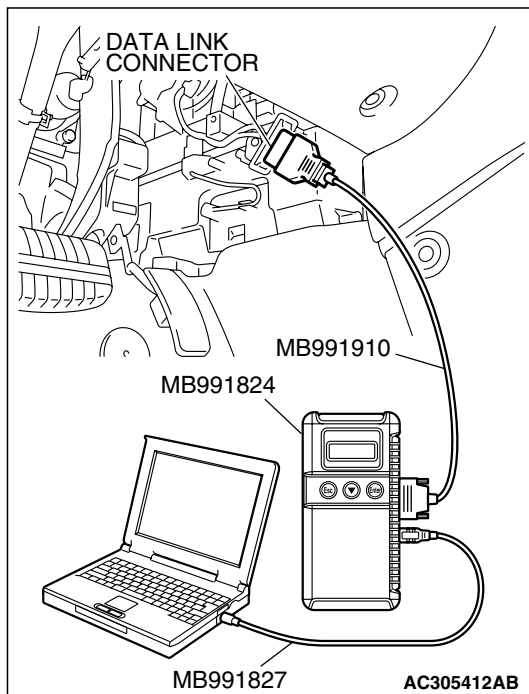
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
 - (2) Start the engine.
 - (3) Set scan tool MB991958 to the data reading mode.
 - Item 15: Transmission Fluid Temperature Sensor.
 - When the engine is cool: Almost equal to the ambient temperature (atmospheric temperature)
- NOTE: Set scan tool MB991958 to the data reading mode for item number 13, Intake Air Temperature (IAT) Sensor and note the temperature measurement. When the engine is cool, the temperature should be almost equal to the ambient temperature (atmospheric temperature), and the IAT sensor measurement should be approximately the same as the Transmission Fluid Temperature Sensor.*
- When the engine is warm: 70 – 80°C (158 – 176°F).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

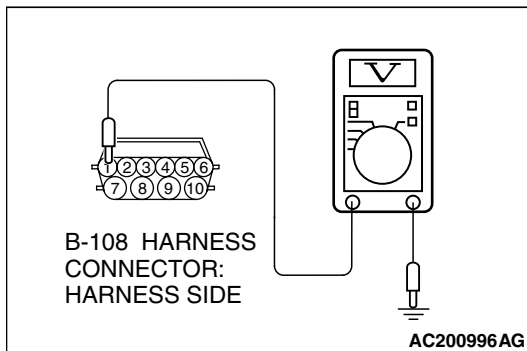
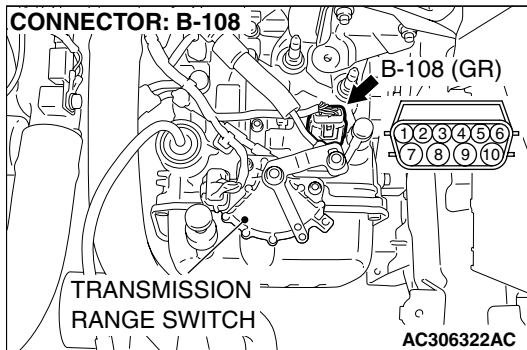
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction [P.00-14](#).

NO : Go to Step 2.



STEP 2. Measure the sensor output voltage at the A/T control solenoid valve assembly connector B-108 by backprobing.

- (1) Do not disconnect connector B-108.
- (2) Turn the ignition switch to the "ON" position.



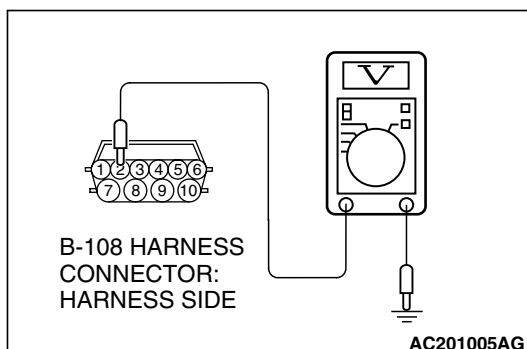
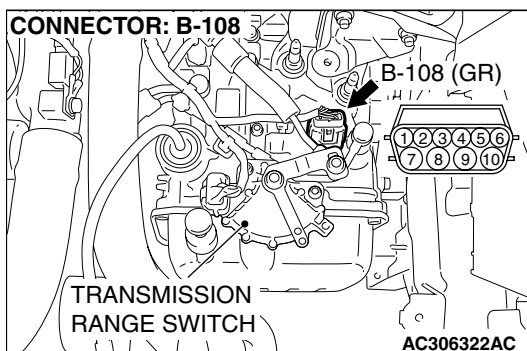
- (3) Measure the voltage between terminal 1 and ground by backprobing.
 - When transmission fluid temperature is 20°C (68°F), voltage should measure between 3.8 and 4.0 volts.
 - When transmission fluid temperature is 40°C (104°F), voltage should measure between 3.2 and 3.4 volts.
 - When transmission fluid temperature is 80°C (176°F), voltage should measure between 1.7 and 1.9 volts.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage within the specified range?

- YES :** Go to Step 6.
NO : Go to Step 3.

STEP 3. Measure the ground voltage at the A/T control solenoid valve assembly connector B-108 by backprobing.

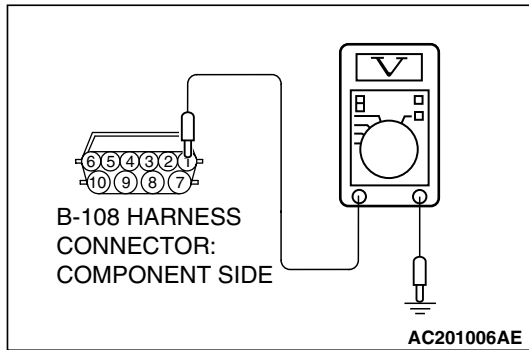
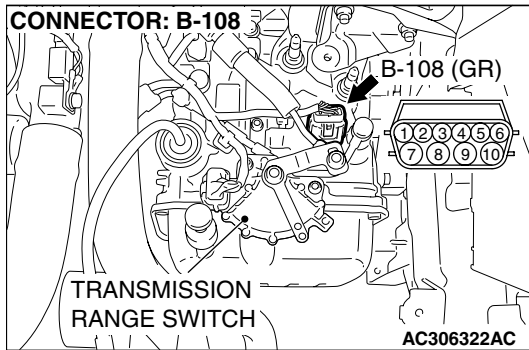
- (1) Do not disconnect connector B-108.
- (2) Turn the ignition switch to the "ON" position.



- (3) Measure the voltage between terminal 2 and ground by backprobing.
 - The voltage should measure 0.5 volt or less.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage 0.5 volt or less?

- YES :** Go to Step 4.
NO : Go to Step 7.



STEP 4. Check the sensor output voltage at A/T control solenoid valve assembly connector B-108.

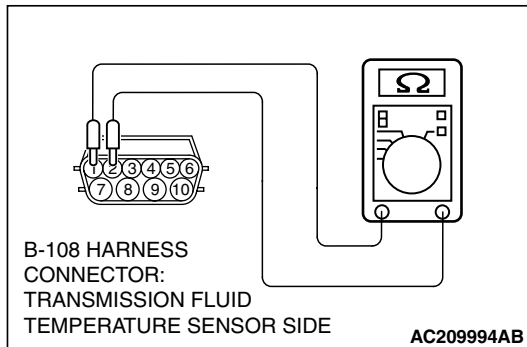
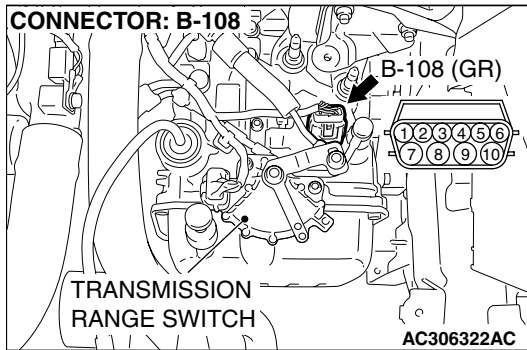
- (1) Disconnect connector B-108 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between terminal 1 and ground.
 - The voltage should measure between 4.5 and 4.9 volts.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage between 4.5 and 4.9 volts?

YES : Go to Step 5.

NO : Go to Step 9.



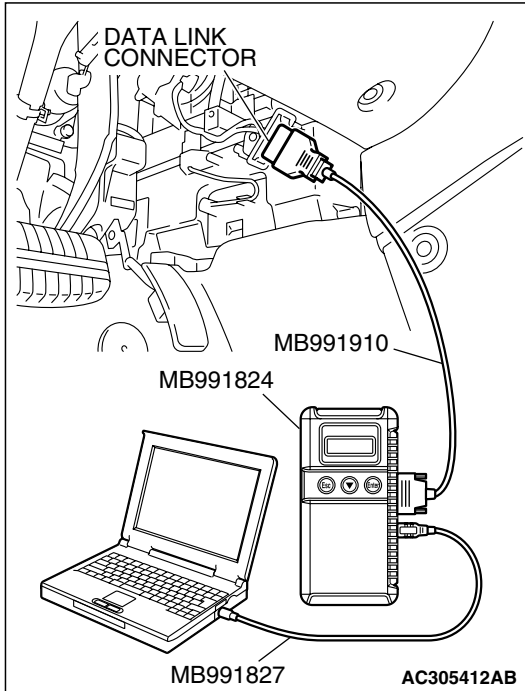
STEP 5. Check the transmission fluid temperature sensor at A/T control solenoid valve assembly connector B-108.

- (1) Disconnect connector B-108 and measure at the sensor side.
- (2) Measure the resistance between terminal 1 and 2.
- When transmission fluid temperature is 0°C (32°F), resistance should be between 16.7 and 20.5 kΩ.
 - When transmission fluid temperature is 20°C (68°F), resistance should be between 7.3 and 8.9 kΩ.
 - When transmission fluid temperature is 40°C (104°F), resistance should be between 3.4 and 4.2 kΩ.
 - When transmission fluid temperature is 60°C (140°F), resistance should be between 1.9 and 2.2 kΩ.
 - When transmission fluid temperature is 80°C (176°F), resistance should be between 1.0 and 1.2 kΩ.
 - When transmission fluid temperature is 100°C (212°F), resistance should be between 0.57 and 0.69 kΩ.

Q: Is the measured resistance within the specified range?

YES : Go to Step 6.

NO : Replace the transmission fluid temperature sensor.
Refer to GROUP 23B, Transaxle [P.23B-10](#).



STEP 6. Using scan tool MB991958, check data list item 15: Transmission Fluid Temperature Sensor.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
 - (2) Start the engine.
 - (3) Set scan tool MB991958 to the data reading mode.
 - Item 15: Transmission Fluid Temperature Sensor.
 - When the engine is cool: Almost equal to the ambient temperature (atmospheric temperature)
- NOTE: Set scan tool MB991958 to data reading mode for item number 13, Intake Air Temperature (IAT) Sensor and note the temperature measurement. When the engine is cool, the temperature should be almost equal to the ambient temperature (atmospheric temperature), and the IAT sensor measurement should be approximately the same as the Transmission Fluid Temperature Sensor.*
- When the engine is warm: 70 – 80°C (158 – 176°F).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

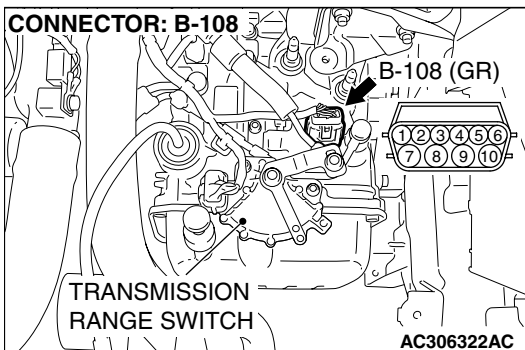
Q: Is the sensor operating properly?

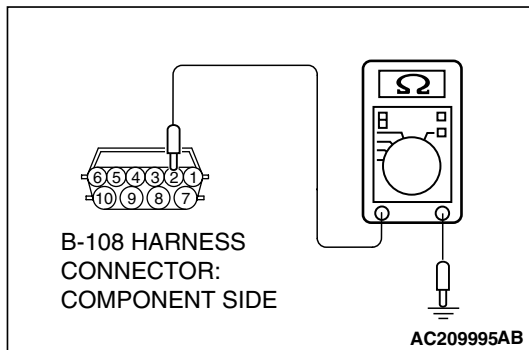
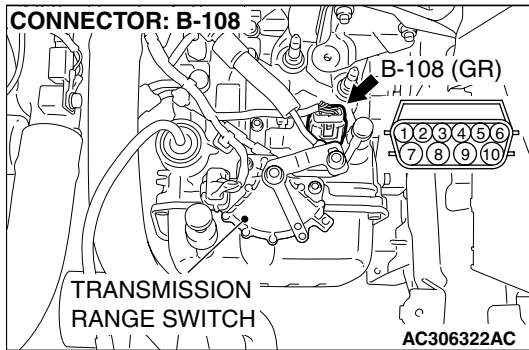
- YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction [P.00-14](#).
- NO :** Replace the PCM.

STEP 7. Check A/T control solenoid valve assembly connector B-108 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

- YES :** Go to Step 8.
- NO :** Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#).





STEP 8. Measure the resistance of the ground circuit at A/T control solenoid valve assembly connector B-108.

(1) Disconnect connector B-108 and measure at the harness side.

(2) Measure the resistance between terminal 2 and ground.
• The resistance should measure less than 2 ohms.

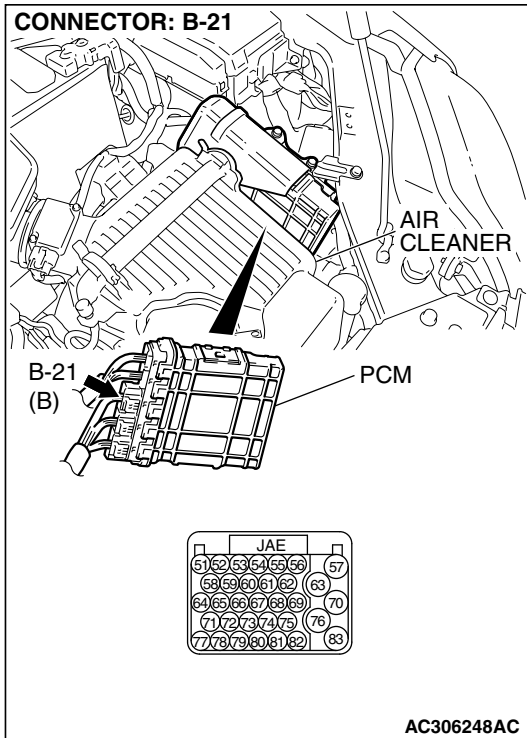
Q: Is the resistance less than 2 ohms?

YES : Go to Step 5.

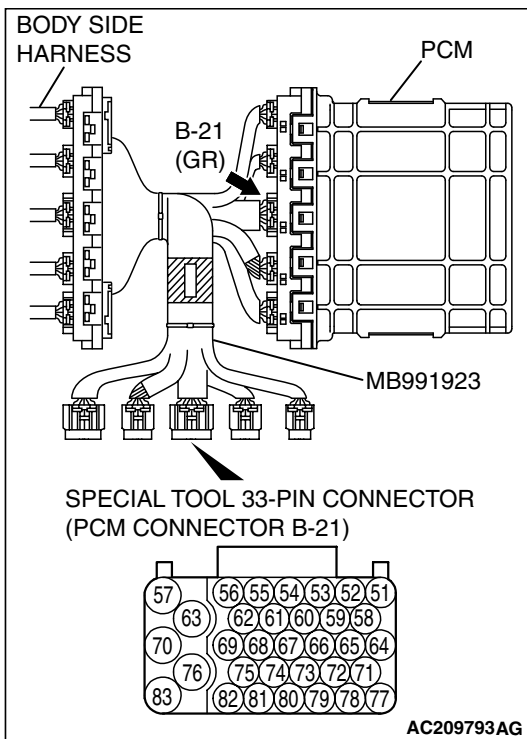
NO : Go to Step 12.

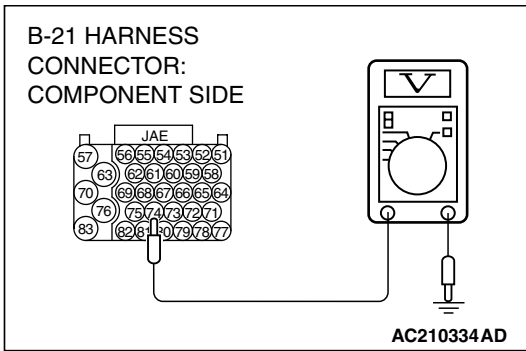
STEP 9. Measure the sensor output voltage at PCM connector B-21 by using check harness special tool MB991923 .

(1) Disconnect all the connectors from the PCM.



- (2) Connect special tool MB991923 (check harness) between the PCM and the body-side harness connector.
- (3) Turn the ignition switch to the "ON" position.





- (4) Measure the voltage between terminal 74 and ground.
- When transmission fluid temperature is 20°C (68°F), voltage should measure between 3.8 and 4.0 volts.
 - When transmission fluid temperature is 40°C (104°F), voltage should measure between 3.2 and 3.4 volts.
 - When transmission fluid temperature is 80°C (176°F), voltage should measure between 1.7 and 1.9 volts.

(5) Turn the ignition switch to the "LOCK" (OFF) position.

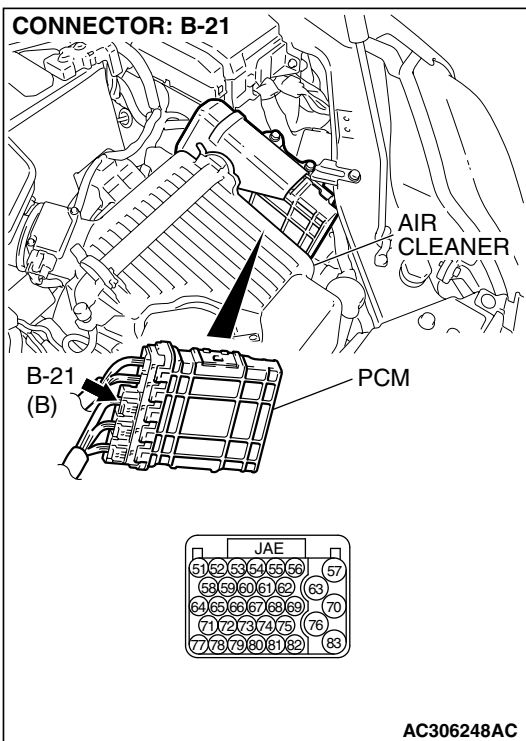
Q: Is the measured voltage within the specified range?

- YES :** Go to Step 6.
NO : Go to Step 10.

STEP 10. Check PCM connector B-21 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

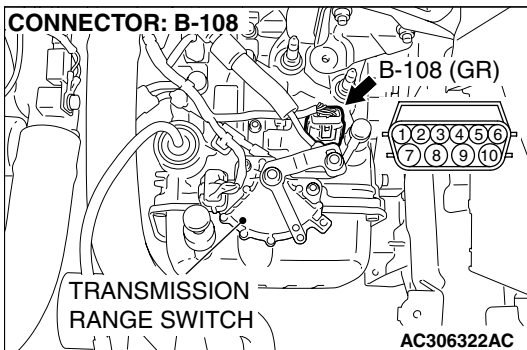
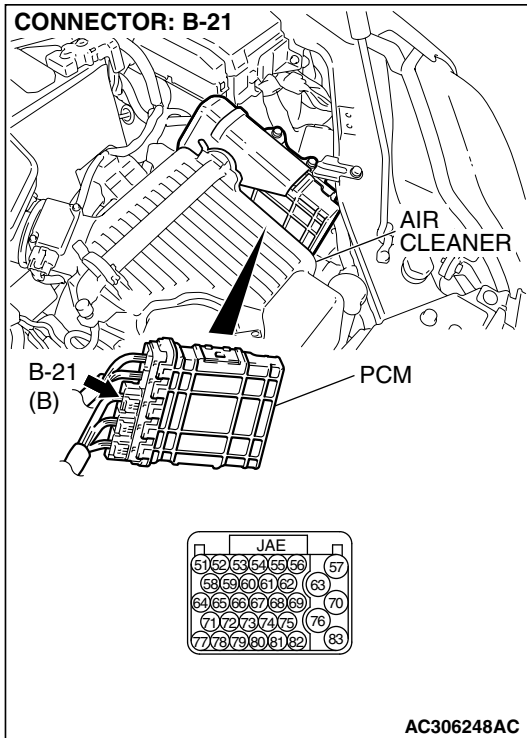
- YES :** Go to Step 11.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#).



STEP 11. Check the harness for open circuit or short circuit to ground between PCM connector B-21 terminal 74 and A/T control solenoid valve connector B-108 terminal 1.
Q: Is the harness wire in good condition?

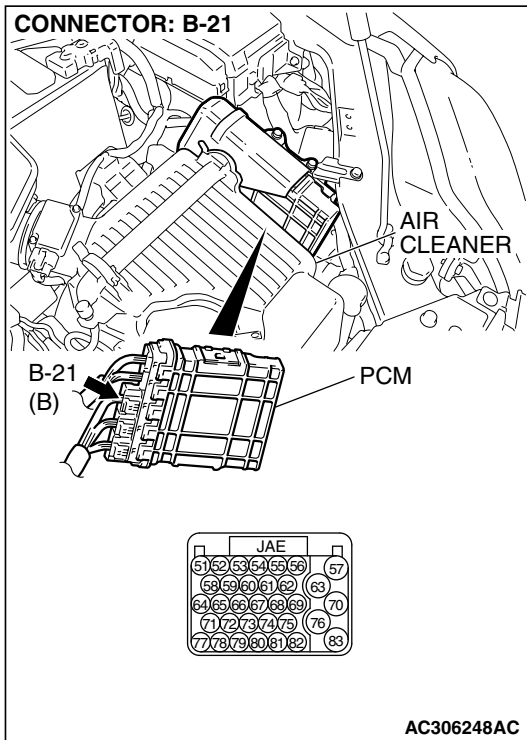
YES : Go to Step 6.

NO : Repair or replace the harness wire.

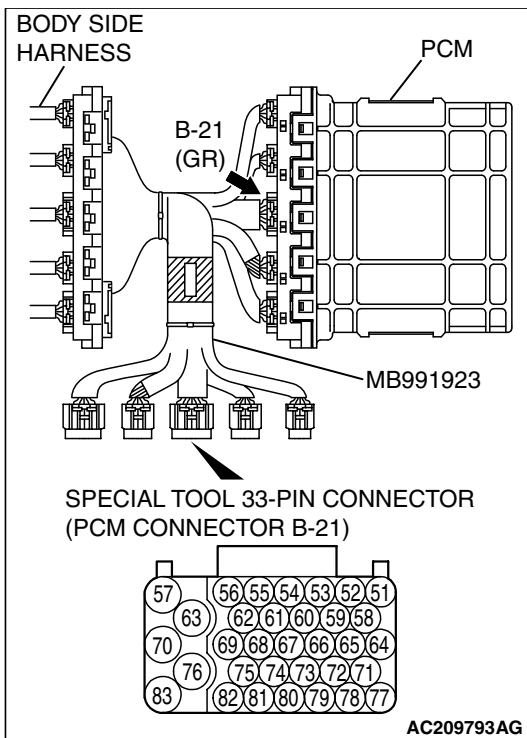


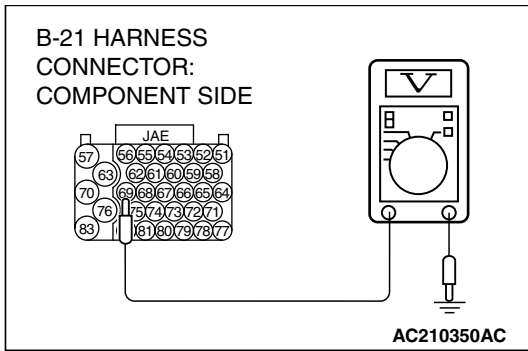
STEP 12. Measure the ground voltage at PCM connector B-21 by using check harness special tool MB991923.

(1) Disconnect all the connectors from the PCM.



- (2) Connect special tool MB991923 (check harness) between the PCM and the body-side harness connector.
- (3) Turn the ignition switch to the "ON" position.

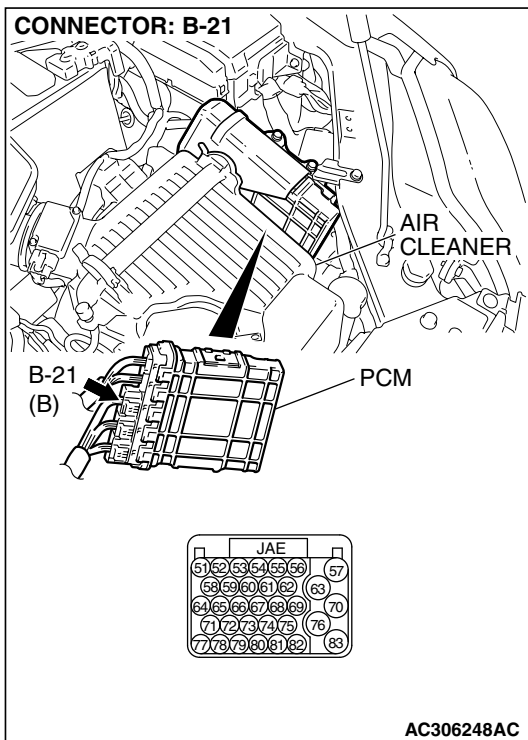




- (4) Measure the voltage between terminal 69 and ground.
 - Voltage should measure 0.5 volt or less.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage within the specified range?

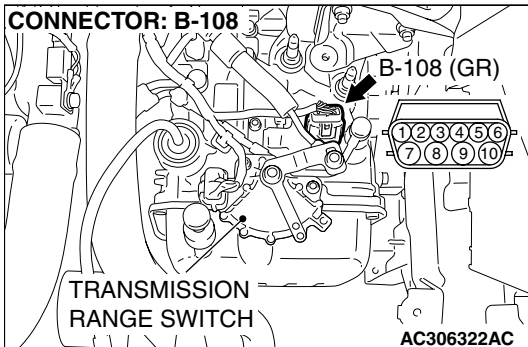
- YES :** Go to Step 13.
NO : Go to Step 14.



STEP 13. Check the harness for open circuit or damage between PCM connector B-21 terminal 69 and A/T control solenoid valve connector B-108 terminal 2.

Q: Is the harness wire in good condition?

- YES :** Go to Step 6.
NO : Repair or replace the harness wire.

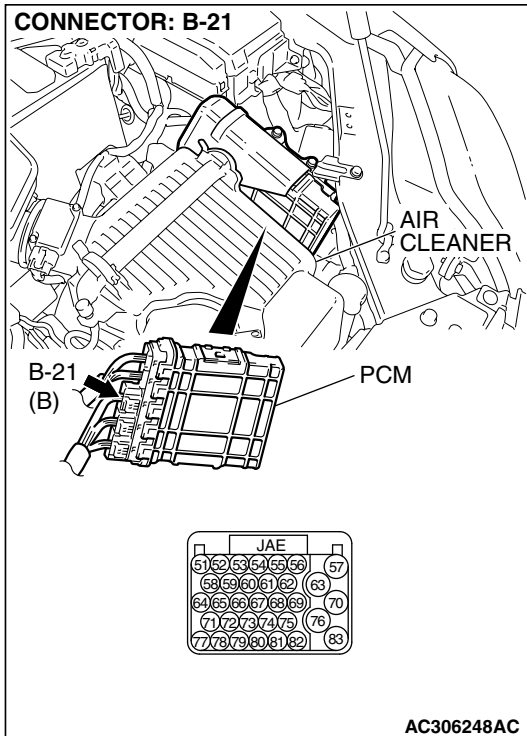


STEP 14. Check PCM connector B-21 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 6.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#).



DTC 16 (P0712): Transmission Fluid Temperature Sensor System (Short Circuit)

TRANSMISSION FLUID TEMPERATURE SENSOR SYSTEM CIRCUIT

Refer to [P.23A-45](#).

CIRCUIT OPERATION

Refer to [P.23A-45](#).

DESCRIPTIONS OF MONITOR METHODS

- If transmission fluid temperature equals or exceeds specified value, PCM judges that transmission fluid temperature sensor has a failure.

MONITOR EXECUTION

- Continuous

MONITOR EXECUTION CONDITIONS (OTHER MONITOR AND SENSOR)

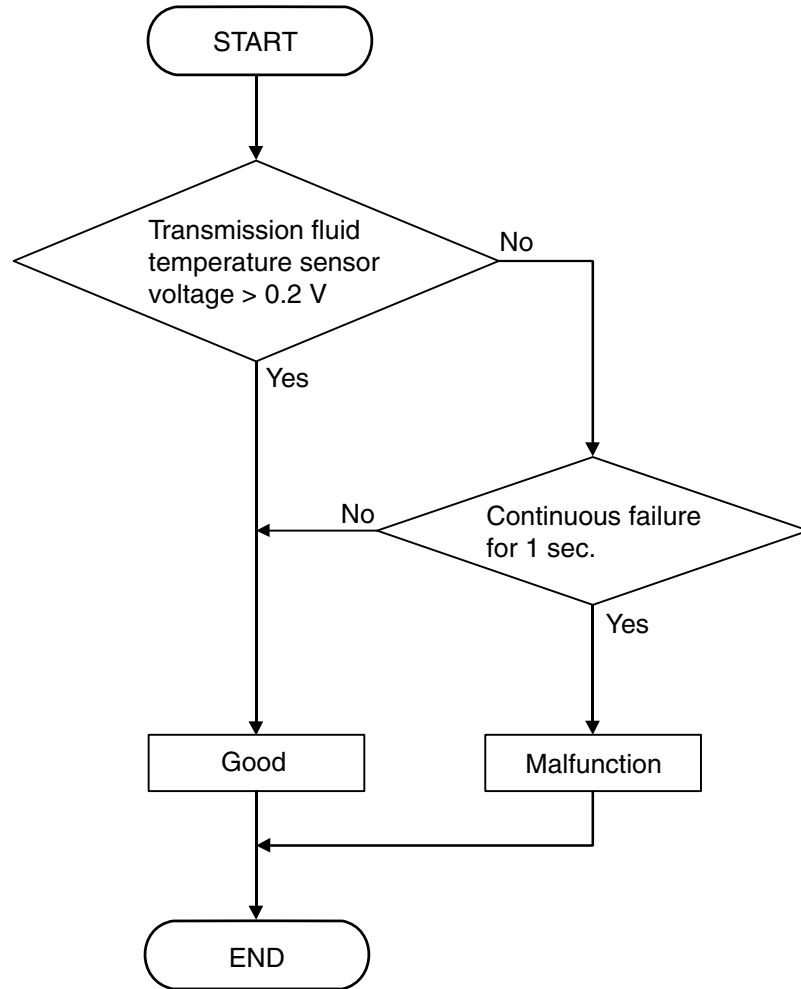
Other Monitor (There is no temporary DTC stored in memory for the item monitored below)

- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

LOGIC FLOW CHARTS (Monitor Sequence)



AC205182

DTC SET CONDITIONS

Check Conditions, Judgement Criteria

- Transmission fluid temperature sensor voltage: 0.2 volt or less. (1 second)

OBD-II DRIVE CYCLE PATTERN

Start the engine, keep the vehicle stopped in "P" range for 5 seconds.

TROUBLESHOOTING HINTS (THE MOST LIKELY CAUSES FOR THIS CODE TO BE SET ARE:)

- Malfunction of the transmission fluid temperature sensor circuit
- Damaged harness or connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:

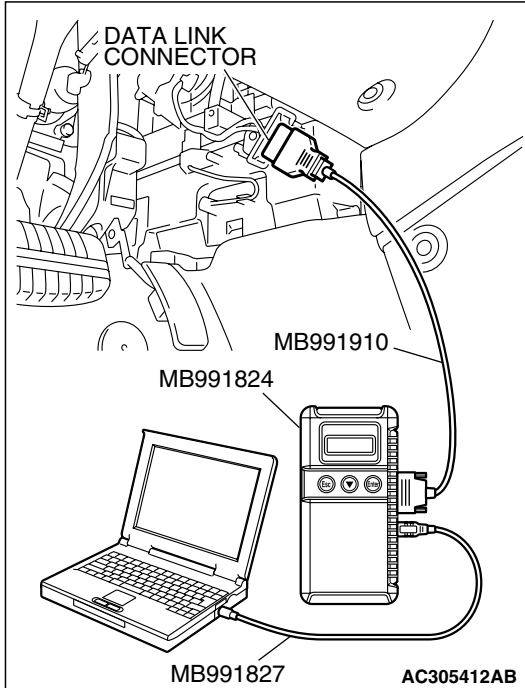
- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A

STEP 1. Using scan tool MB991958, check data list item 15: Transmission Fluid Temperature Sensor.

⚠ CAUTION

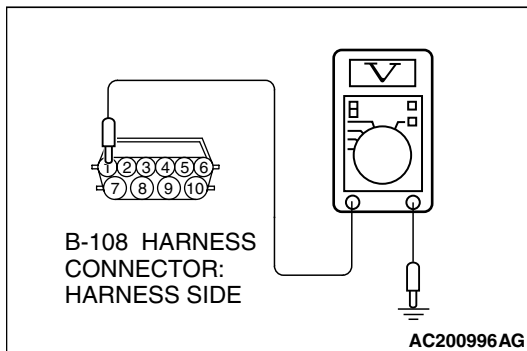
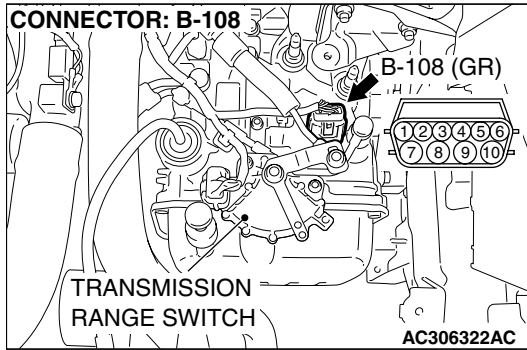
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Start the engine.
- (3) Set scan tool MB991958 to the data reading mode.
 - Item 15: Transmission Fluid Temperature Sensor.
 - When the engine is cool: Almost equal to the ambient temperature (atmospheric temperature)
NOTE: Set scan tool MB991958 to the data reading mode for item number 13, Intake Air Temperature (IAT) Sensor and note the temperature measurement. When the engine is cool, the temperature should be almost equal to the ambient temperature (atmospheric temperature), and the IAT sensor measurement should be approximately the same as the Transmission Fluid Temperature Sensor.
 - When the engine is warm: 70 – 80°C (158 – 176°F).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.



Q: Is the sensor operating properly?

- YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction [P.00-14](#).
- NO :** Go to Step 2.



STEP 2. Measure the sensor output voltage at the A/T control solenoid valve assembly connector B-108 by backprobing.

- (1) Do not disconnect connector B-108.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between terminal 1 and ground by backprobing.
 - When transmission fluid temperature is 20°C (68°F), voltage should measure between 3.8 and 4.0 volts.
 - When transmission fluid temperature is 40°C (104°F), voltage should measure between 3.2 and 3.4 volts.
 - When transmission fluid temperature is 80°C (176°F), voltage should measure between 1.7 and 1.9 volts.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

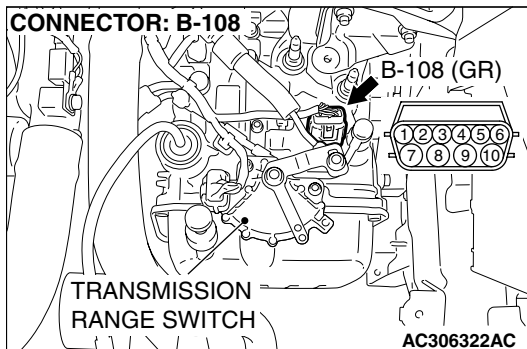
Q: Is the measured voltage within the specified range?

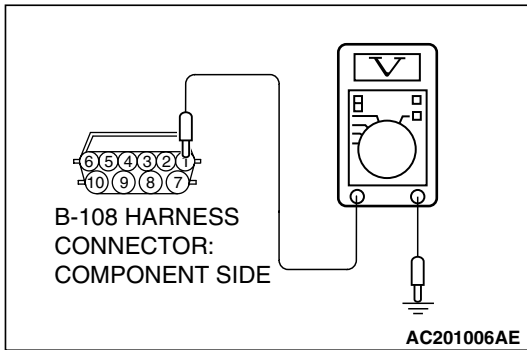
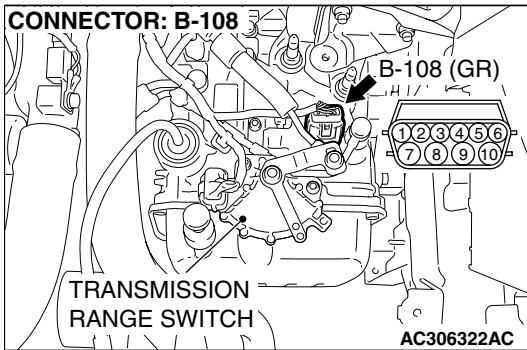
- YES :** Go to Step 6.
NO : Go to Step 3.

STEP 3. Check A/T control solenoid valve assembly connector B-108 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

- YES :** Go to Step 4.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#).





STEP 4. Check the sensor output voltage at A/T control solenoid valve assembly connector B-108.

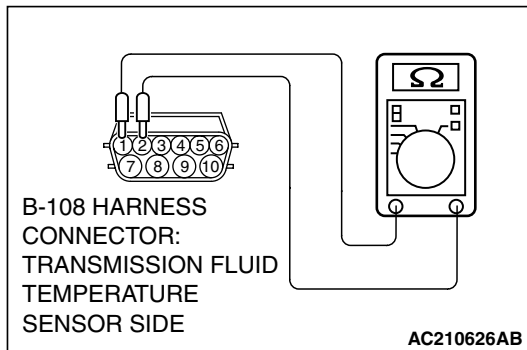
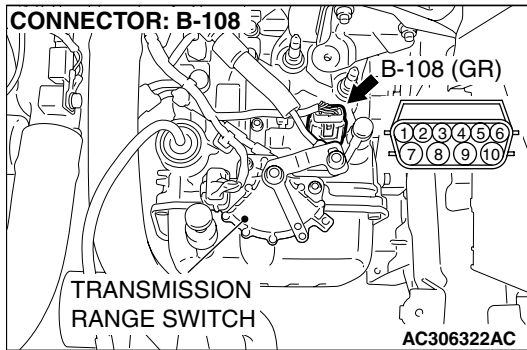
- (1) Disconnect connector B-108 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between terminal 1 and ground.
 - The voltage should measure between 4.5 and 4.9 volts.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage between 4.5 and 4.9 volts?

YES : Go to Step 5.

NO : Go to Step 7.



STEP 5. Check the transmission fluid temperature sensor at A/T control solenoid valve assembly connector B-108.

(1) Disconnect connector B-108 and measure at the sensor side.

(2) Measure the resistance between terminal 1 and 2.

- When transmission fluid temperature is 0°C (32°F), resistance should be between 16.7 and 20.5 kΩ.
- When transmission fluid temperature is 20°C (68°F), resistance should be between 7.3 and 8.9 kΩ.
- When transmission fluid temperature is 40°C (104°F), resistance should be between 3.4 and 4.2 kΩ.
- When transmission fluid temperature is 60°C (140°F), resistance should be between 1.9 and 2.2 kΩ.
- When transmission fluid temperature is 80°C (176°F), resistance should be between 1.0 and 1.2 kΩ.
- When transmission fluid temperature is 100°C (212°F), resistance should be between 0.57 and 0.69 kΩ.

Q: Is the measured resistance within the specified range?

YES : Go to Step 6.

NO : Replace the transmission fluid temperature sensor.
Refer to GROUP 23B, Transaxle [P.23B-10](#).

STEP 6. Using scan tool MB991958, check data list item 15: Transmission Fluid Temperature Sensor.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Start the engine.
- (3) Set scan tool MB991958 to the data reading mode.

- Item 15: Transmission Fluid Temperature Sensor.
 - When the engine is cool: Almost equal to the ambient temperature (atmospheric temperature)

NOTE: Set scan tool MB991958 to the data reading mode for item number 13, Intake Air Temperature (IAT) Sensor and note the temperature measurement. When the engine is cool, the temperature should be almost equal to the ambient temperature (atmospheric temperature), and the IAT sensor measurement should be approximately the same as the Transmission Fluid Temperature Sensor.

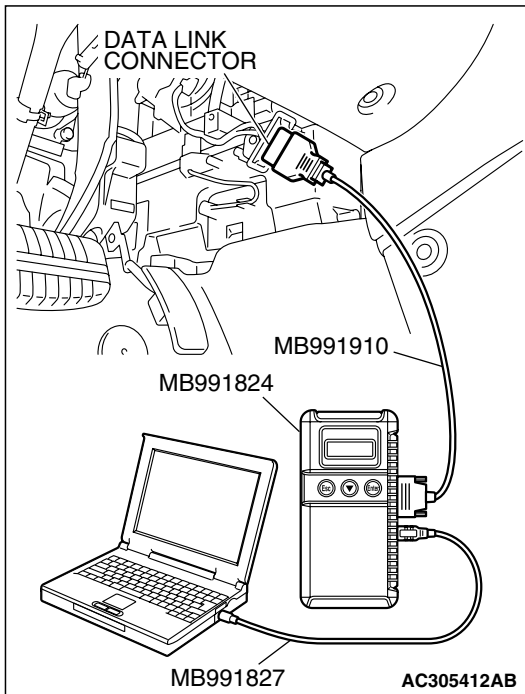
- When the engine is warm: 70 – 80°C (158 – 176°F).

- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

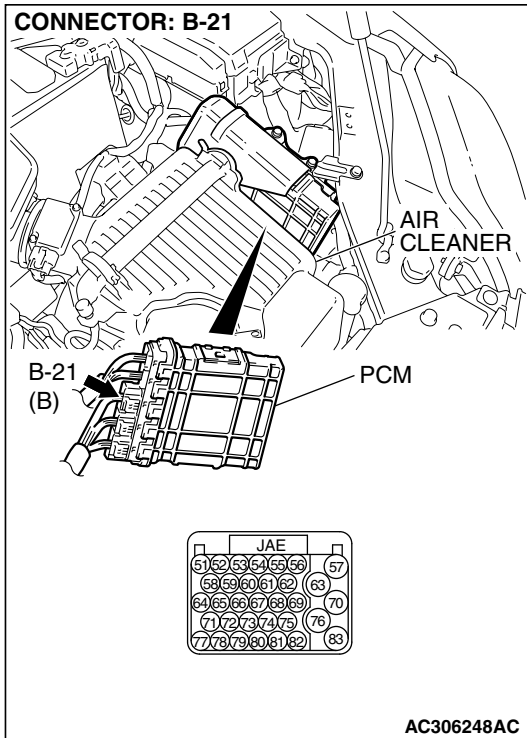
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction [P.00-14](#).

NO : Replace the PCM.

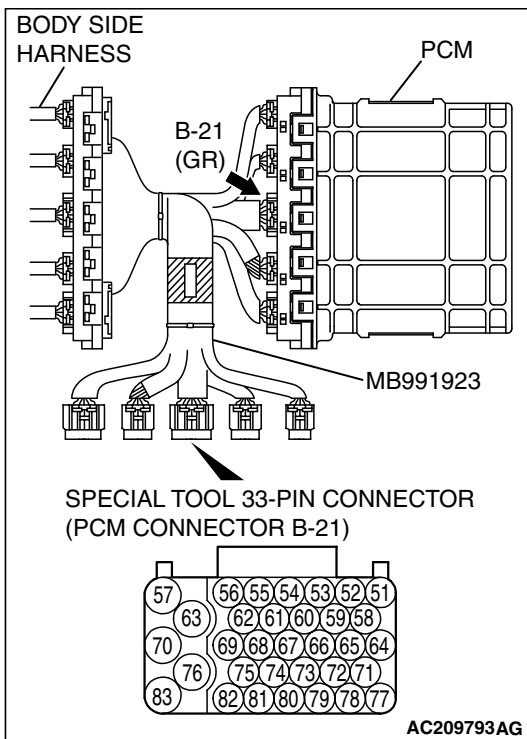


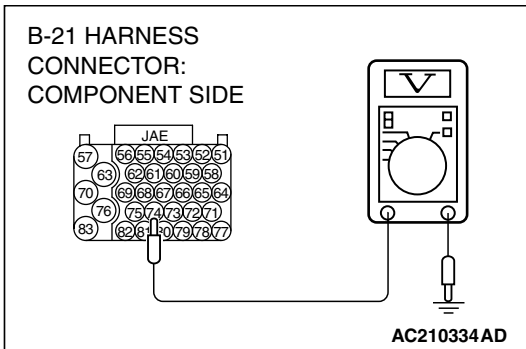
STEP 7. Measure the sensor output voltage at PCM connector B-21 by using check harness special tool MB991923.

(1) Disconnect all the connectors from the PCM.



- (2) Connect special tool MB991923 (check harness) between the PCM and the body-side harness connector.
- (3) Turn the ignition switch to the "ON" position.





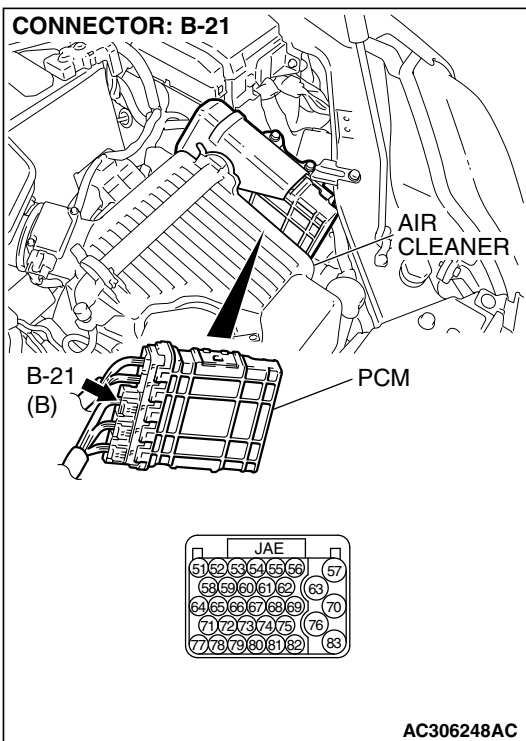
- (4) Measure the voltage between terminal 74 and ground.
- When transmission fluid temperature is 20°C (68°F), voltage should measure between 3.8 and 4.0 volts.
 - When transmission fluid temperature is 40°C (104°F), voltage should measure between 3.2 and 3.4 volts.
 - When transmission fluid temperature is 80°C (176°F), voltage should measure between 1.7 and 1.9 volts.

(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage within the specified range?

YES : Go to Step 6.

NO : Go to Step 8.



STEP 8. Check PCM connector B-21 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 9.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection

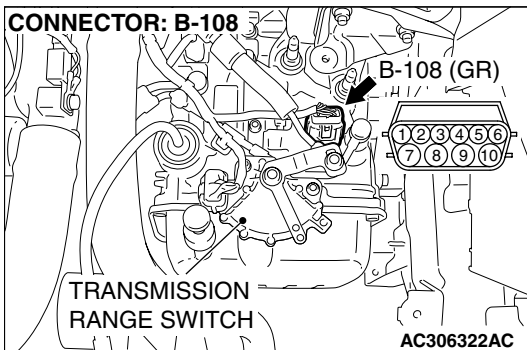
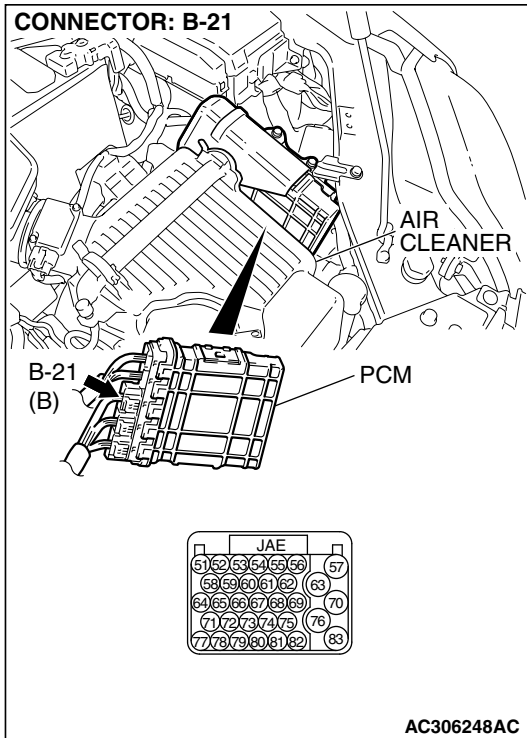
[P.00E-2.](#)

STEP 9. Check the harness for a short circuit to ground between PCM connector B-21 terminal 74 and A/T control solenoid valve connector B-108 terminal 1.

Q: Is the harness wire in good condition?

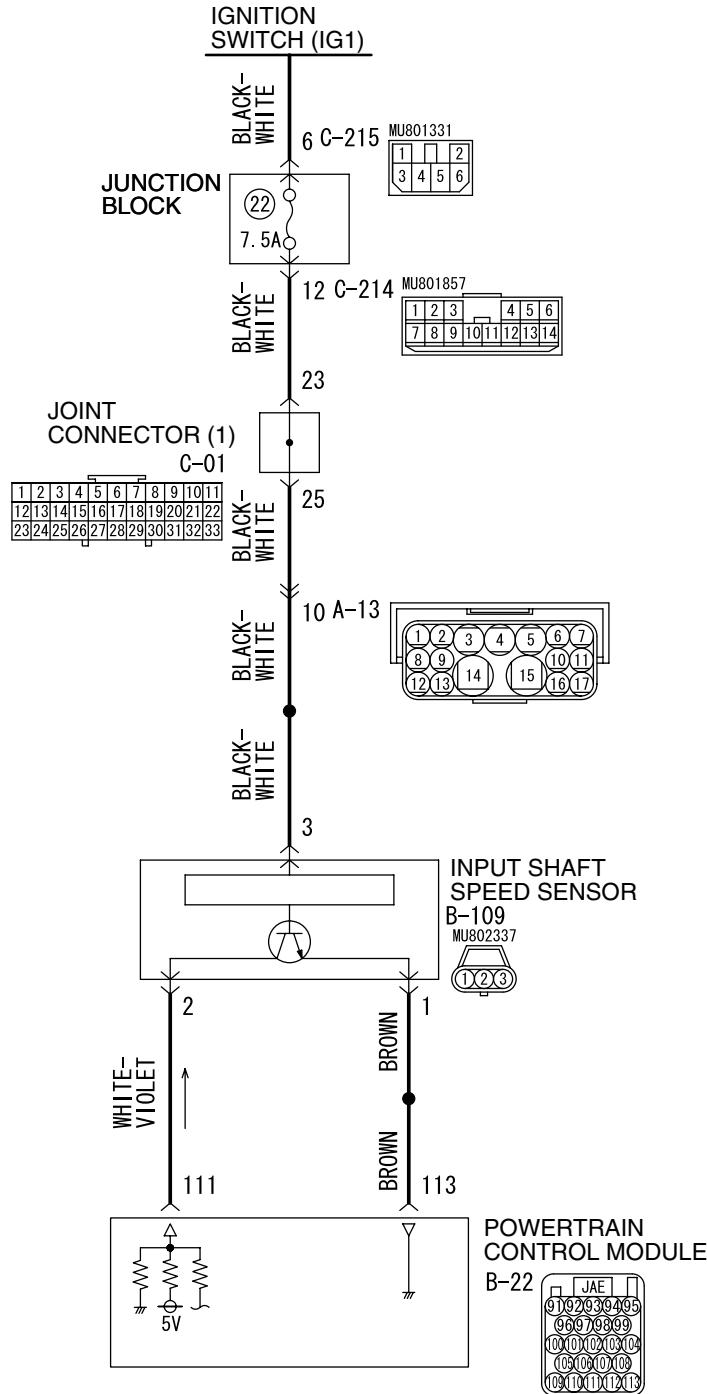
YES : Go to Step 6.

NO : Repair or replace the harness wire.

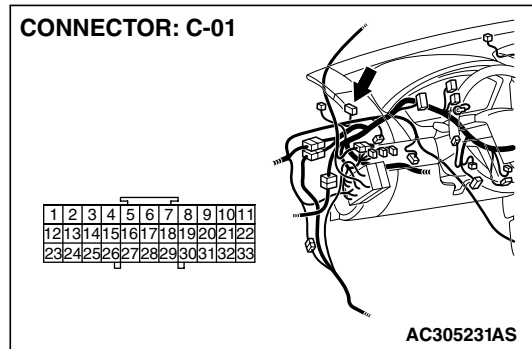
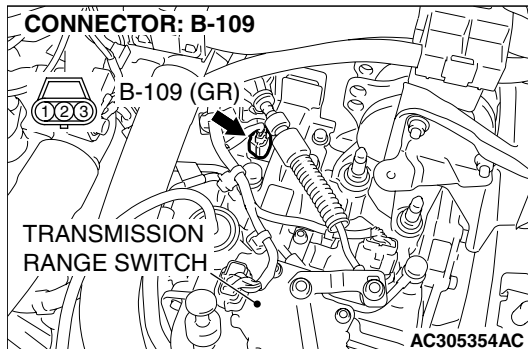
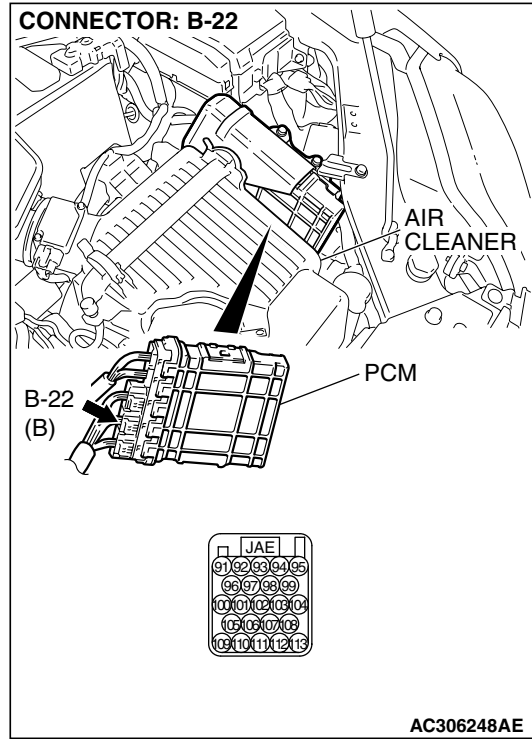
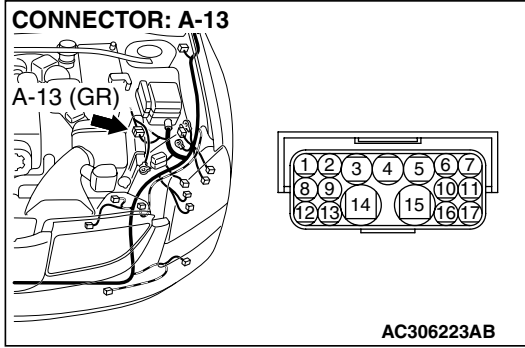


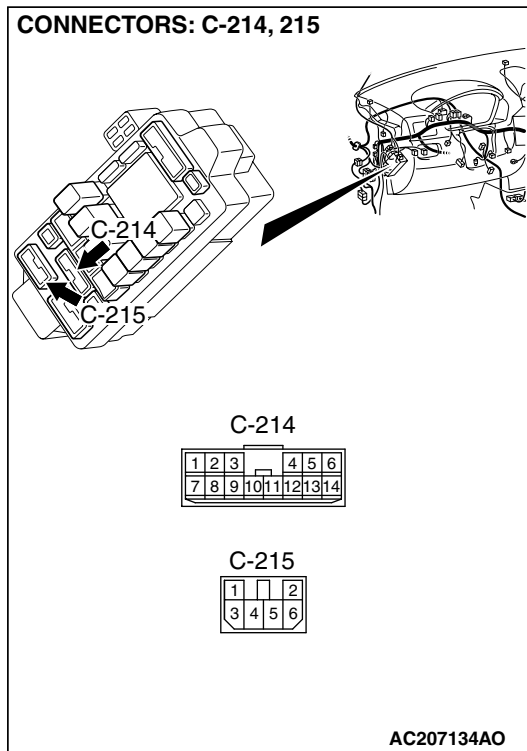
DTC 22 (P0715): Input Shaft Speed Sensor System

Input Shaft Speed Sensor System Circuit



W4P06M02AA
AC209755AC





CIRCUIT OPERATION

- The input shaft speed sensor generates 0 ⇔ 5 volts pulse signal when the input shaft rotates. The pulse signal frequency increases with a rise in input shaft speed.
- The input shaft speed sensor is connected to the PCM (terminals 111 and 113) via the input shaft speed sensor connector (terminals 1 and 2).
- The PCM detects the input shaft speed by the signal input to terminal 111.
- The input shaft speed sensor generates the pulse signal as the teeth of the underdrive clutch retainer pass the magnetic tip of the sensor.

DESCRIPTIONS OF MONITOR METHODS

- If there is no detection pulse from input shaft speed sensor (turbine rotation) even during driving test at more than specified speed, PCM judges that input shaft speed sensor has a failure.

MONITOR EXECUTION

- Continuous

MONITOR EXECUTION CONDITIONS (OTHER MONITOR AND SENSOR)

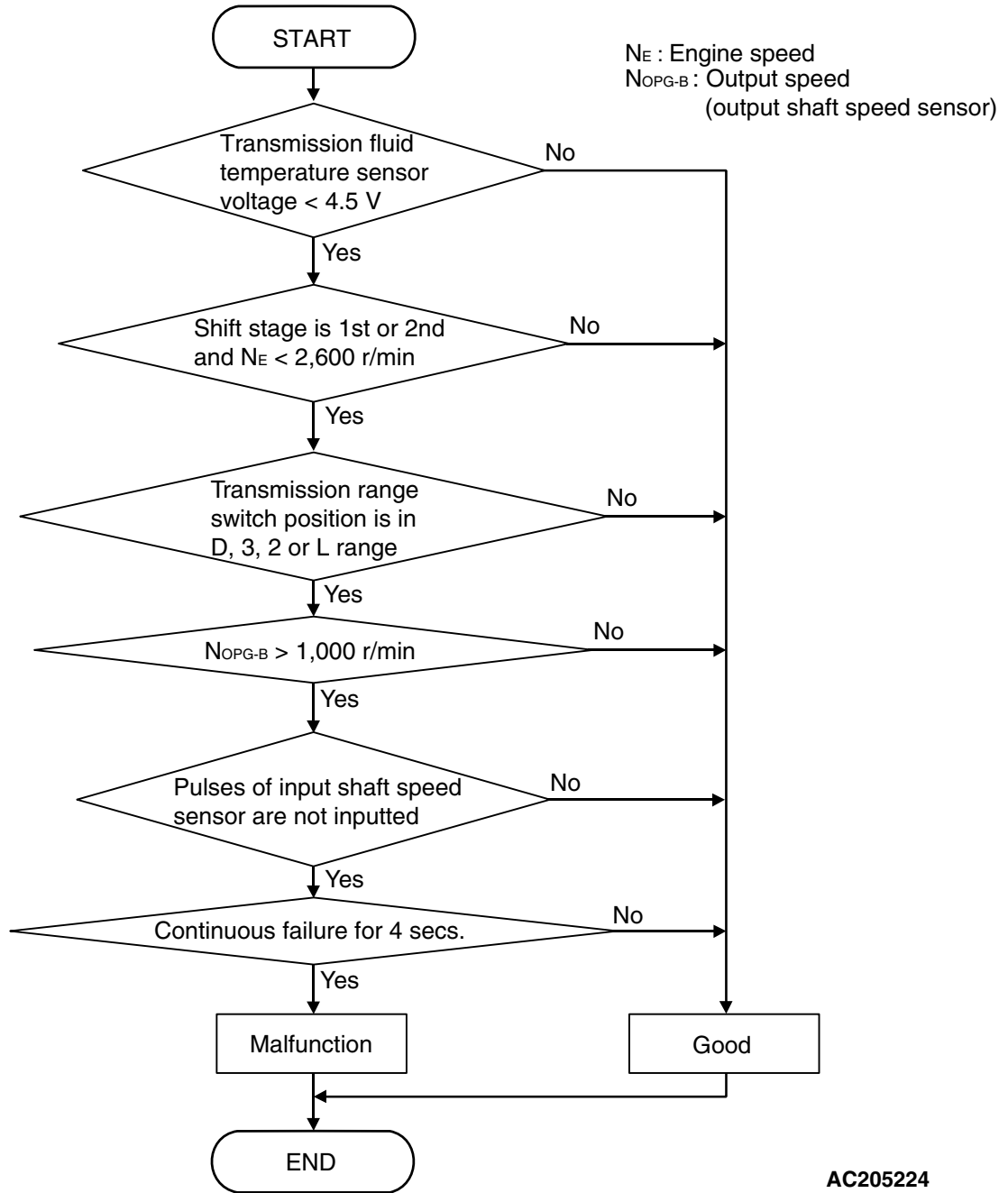
Other Monitor (There is no temporary DTC stored in memory for the item monitored below)

- DTC 23 (P0720): Output shaft speed sensor malfunction

Sensor (The sensor below is determined to be normal)

- Output shaft speed sensor

LOGIC FLOW CHARTS (Monitor Sequence)



AC205224

DTC SET CONDITIONS

Check Conditions

- Transmission range switch position: D, 3, 2 or L.
- Output speed: 1,000 r/min or more.
- Transmission fluid temperature sensor voltage: 4.5 volts or less.

Judgement Criteria

- Input shaft speed sensor signal: no signal change. (4 seconds)

- If DTC 22 (P0715) is set consecutively four times, the transaxle is locked into 3rd gear or 2nd gear as a fail-safe measure, and the "N" range light flashes once per second.

OBD-II DRIVE CYCLE PATTERN

Start the engine, shift to 3rd gear or higher, and drive at 40 km/h (25 mph) or more for 10 seconds.

TROUBLESHOOTING HINTS (THE MOST LIKELY CAUSES FOR THIS CODE TO BE SET ARE:)

- Malfunction of the input shaft speed sensor
- Malfunction of the underdrive clutch retainer
- Damaged harness or connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A

STEP 1. Using scan tool MB991958, check data list item 22: Input Shaft Speed Sensor.

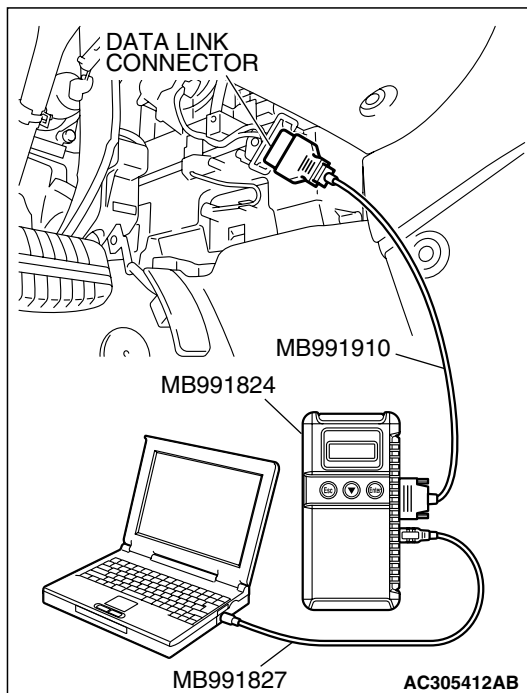
⚠ CAUTION

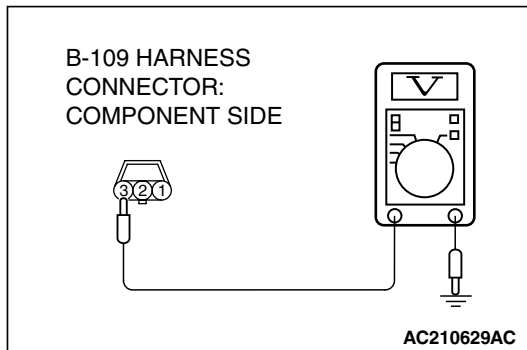
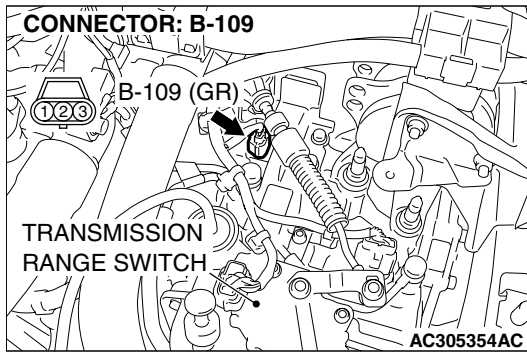
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Start the engine.
- (3) Set scan tool MB991958 to data reading mode.
 - Item 22: Input Shaft Speed Sensor.
 - When driving at constant speed of 50 km/h (31 mph), the display should be "1,400 – 1,700 r/min" (Gear range: 3rd gear).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

- YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction [P.00-14](#).
- NO :** Go to Step 2.





STEP 2. Measure the power supply voltage at the input shaft speed sensor connector B-109.

- (1) Disconnect connector B-109 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between terminal 3 and ground.
 - The voltage should measure battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 5.

NO : Go to Step 3.

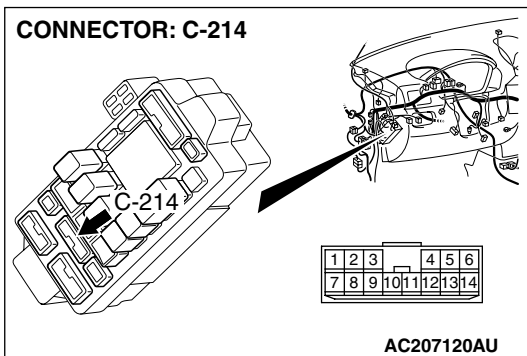
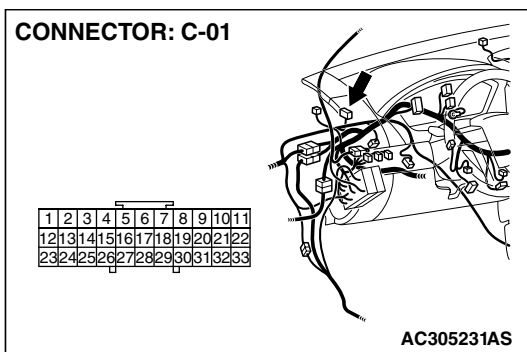
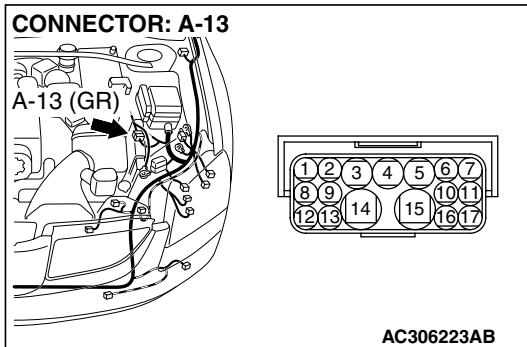
STEP 3. Check intermediate connector A-13, joint connector (1) C-01 and junction block connector C-214 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 4.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection

[P.00E-2.](#)

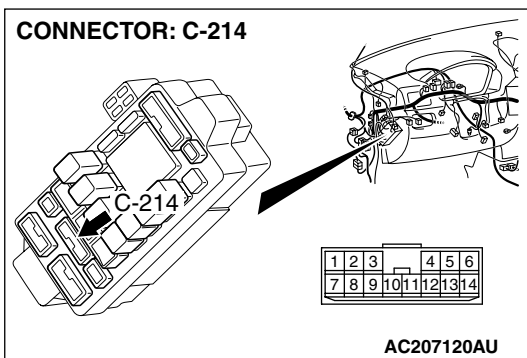
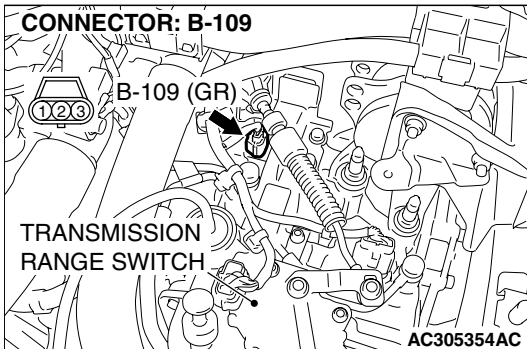


STEP 4. Check the harness for open circuit or short circuit to ground between the input shaft speed sensor connector B-109 terminal 3 and the junction block connector C-214 terminal 12.

Q: Is the harness wire in good condition?

YES : Go to Step 5.

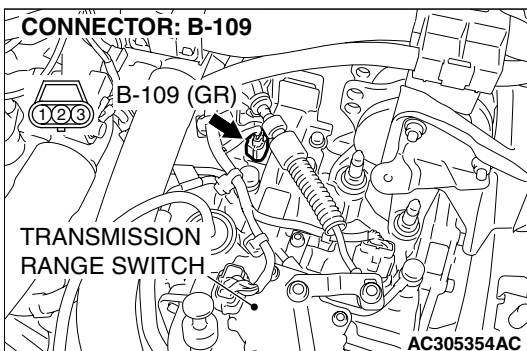
NO : Repair or replace the harness wire.



STEP 5. Measure the PCM to speed sensor output voltage at the input shaft speed sensor connector B-109.

(1) Disconnect connector B-109 from the speed sensor and measure voltage at the harness side.

(2) Turn the ignition switch to the "ON" position.



(3) Measure the voltage between terminal 2 and ground.

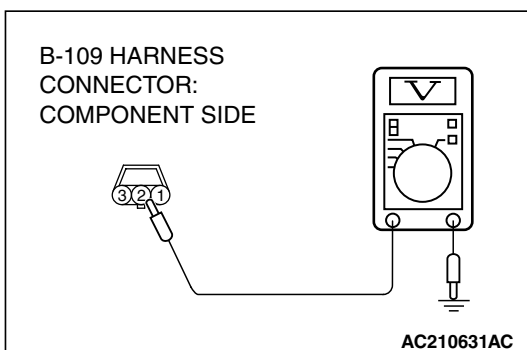
- The voltage should measure between 4.5 and 4.9 volts.

(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage between 4.5 and 4.9 volts?

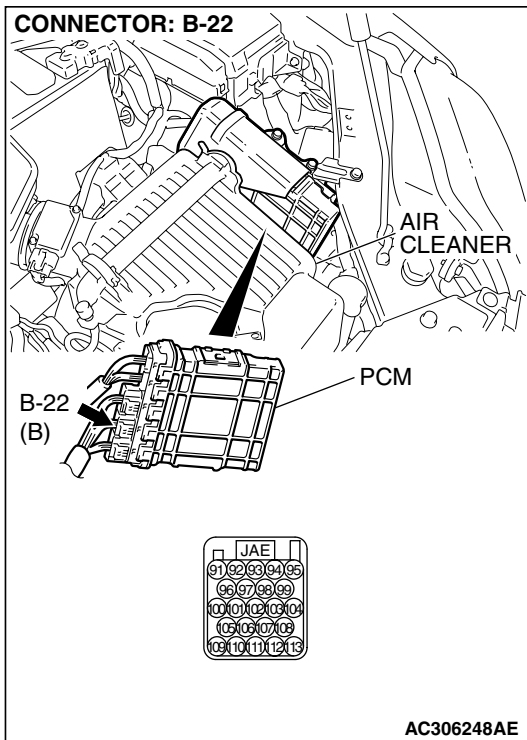
YES : Go to Step 11.

NO : Go to Step 6.



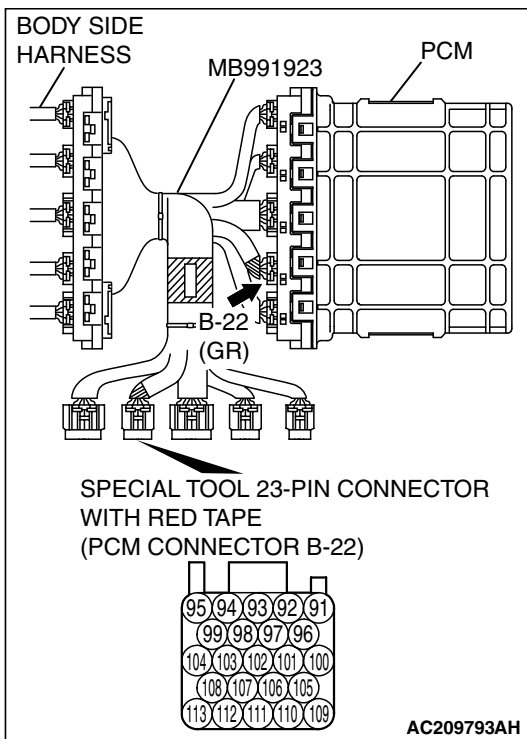
STEP 6. Measure the PCM output voltage to the speed sensor at the PCM connector B-22 by using check harness special tool MB991923.

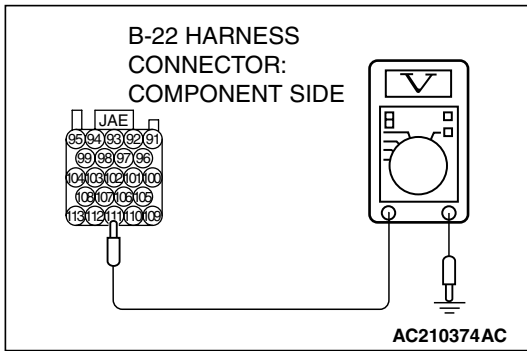
(1) Disconnect all the connectors from the PCM.



(2) Connect special tool MB991923 (check harness) between the PCM and the body-side harness connector.

(3) Turn the ignition switch to the "ON" position.

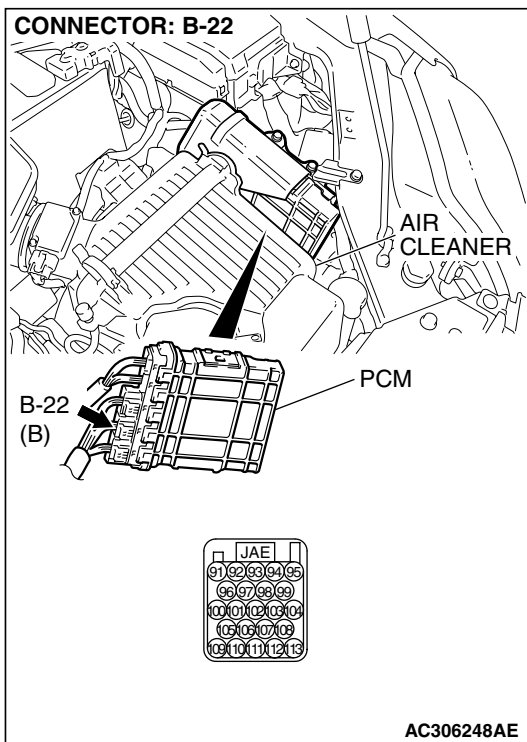




- (4) Measure the voltage between PCM terminal 111 and ground.
- The voltage should measure between 4.5 and 4.9 volts.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage between 4.5 and 4.9 volts?

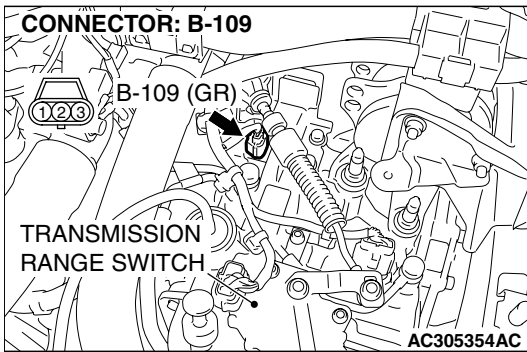
- YES** : Go to Step 7.
NO : Go to Step 9.



STEP 7. Check PCM connector B-22 and input shaft speed sensor connector B-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors in good condition?

- YES** : Go to Step 8.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#).

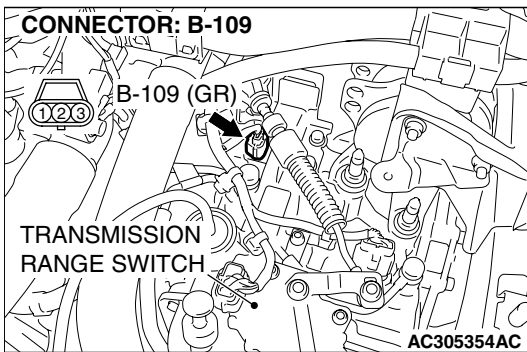
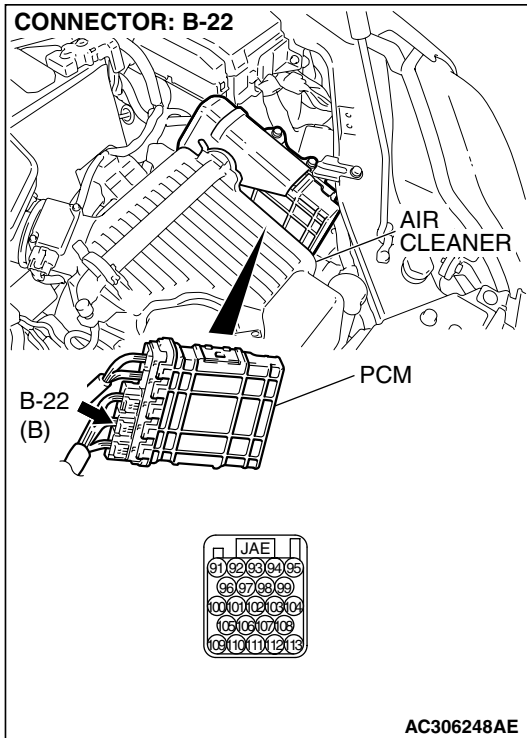


STEP 8. Check the harness for open circuit or damage between PCM connector B-22 terminal 111 and input shaft speed sensor connector B-109 terminal 2.

Q: Is the harness wire in good condition?

YES : Go to Step 19.

NO : Repair or replace the harness wire.



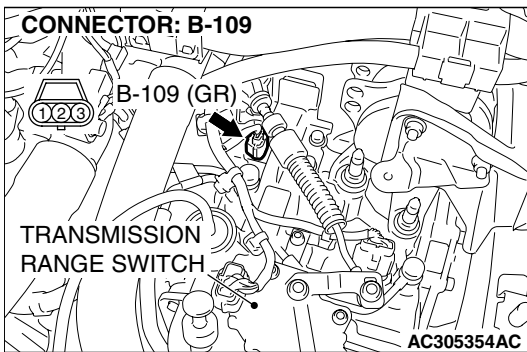
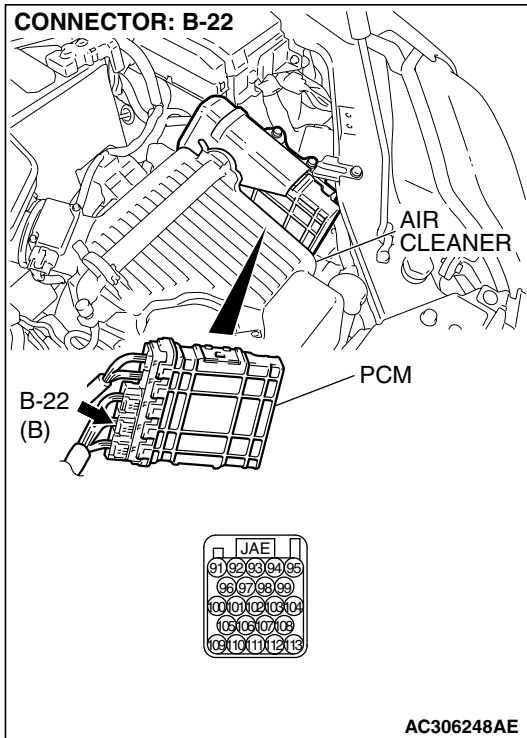
STEP 9. Check PCM connector B-22 and input shaft speed sensor connector B-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 10.

NO : Repair or replace the damages components. Refer to GROUP 00E, Hamess Connector Inspection

[P.00E-2.](#)

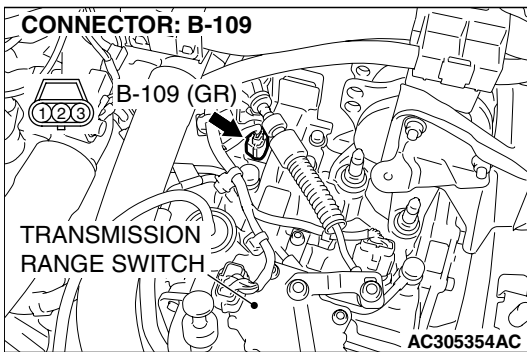
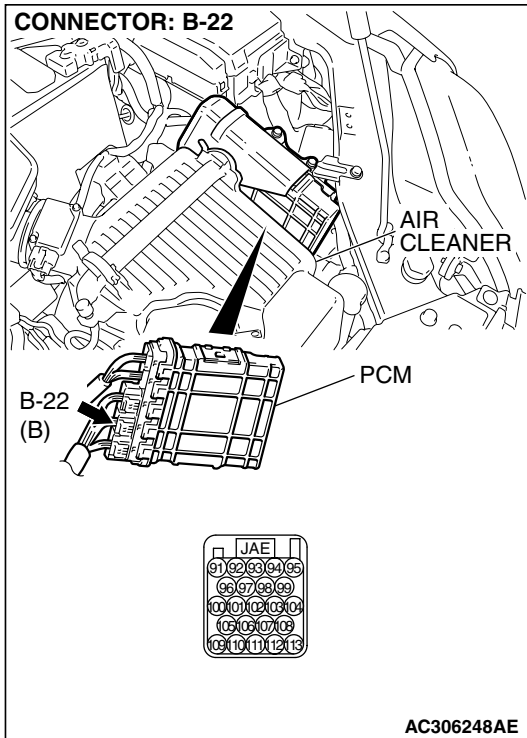


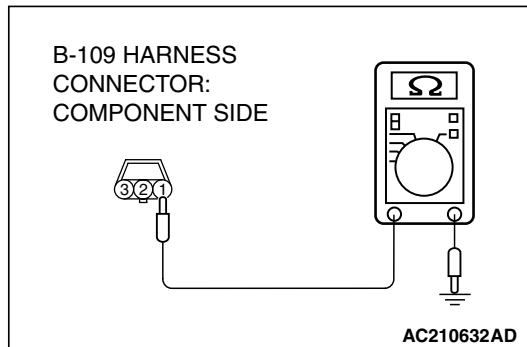
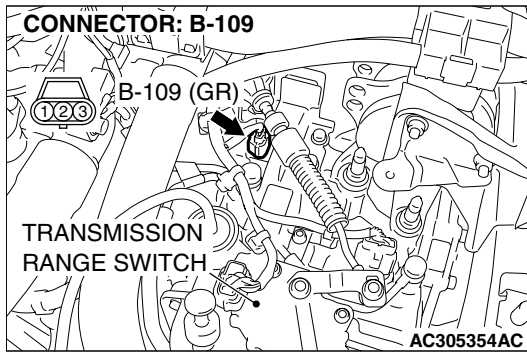
STEP 10. Check the harness for short circuit to ground between PCM connector B-22 terminal 111 and input shaft speed sensor connector B-109 terminal 2.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

NO : Repair or replace the harness wire.





STEP 11. Measure the ground circuit for resistance at the input shaft speed sensor connector B-109.

(1) Disconnect connector B-109 from the speed sensor and measure at the harness side.

(2) Measure the resistance between terminal 1 and ground.

- The resistance should measure less than 2 ohms.

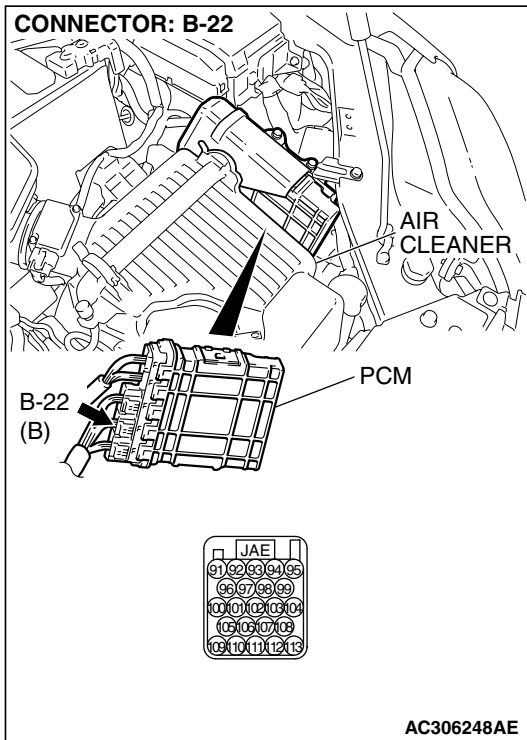
Q: Is the measured resistance less than 2 ohms?

YES : Go to Step 16.

NO : Go to Step 12.

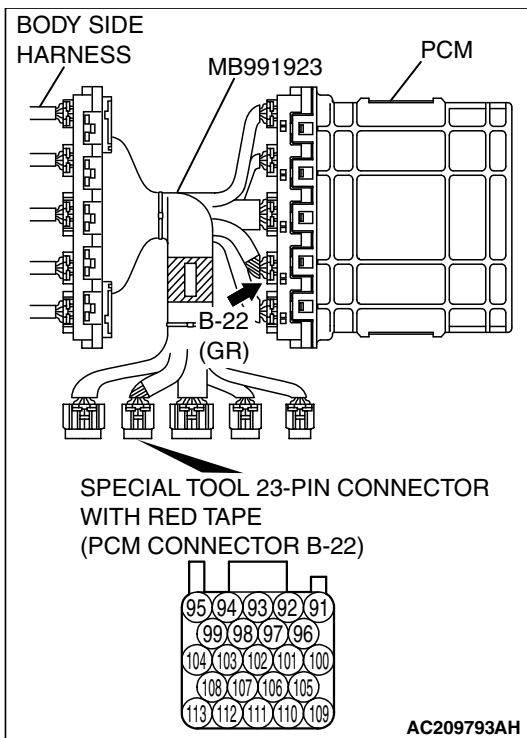
STEP 12. Measure the resistance at the PCM connector B-22 by using check harness special tool.

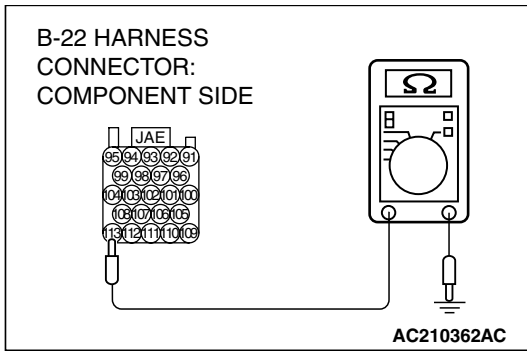
(1) Disconnect all the connectors from the PCM.



(2) Connect special tool MB991923 (check harness) between the PCM and the body-side harness connector.

(3) Turn the ignition switch to the "ON" position.

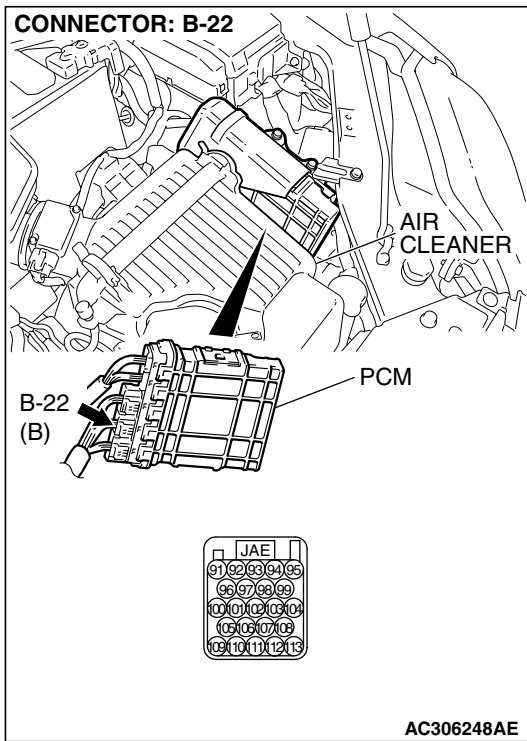




- (4) Measure the resistance between terminal 113 and ground.
 • The resistance should measure less than 2 ohms.
 (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured resistance less than 2 ohms?

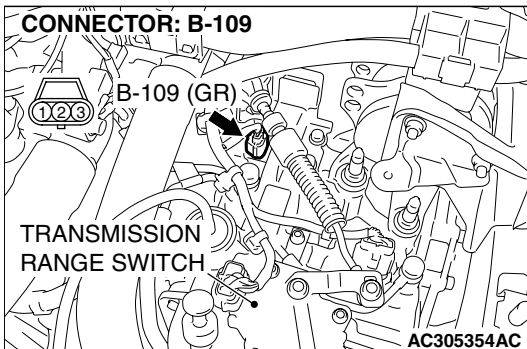
- YES :** Go to Step 13.
NO : Go to Step 15.



STEP 13. Check PCM connector B-22 and input shaft speed sensor connector B-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

- YES :** Go to Step 14.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#).

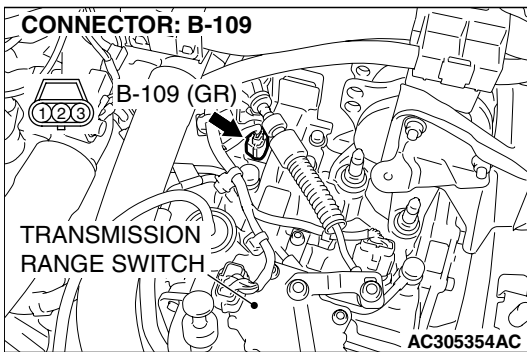
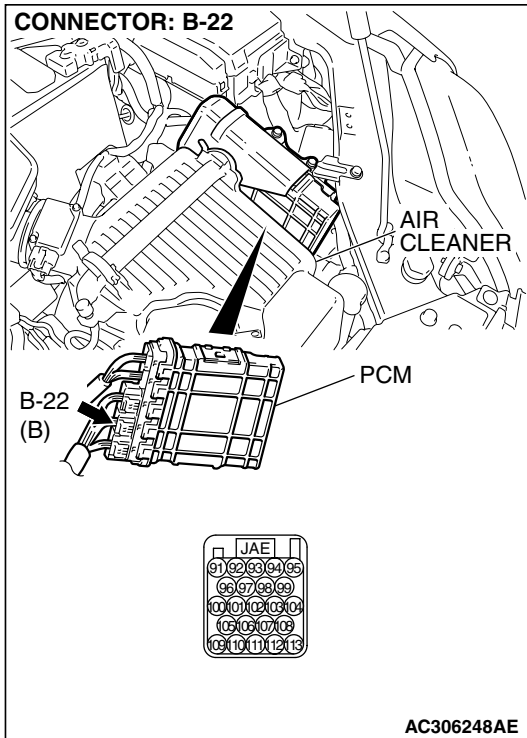


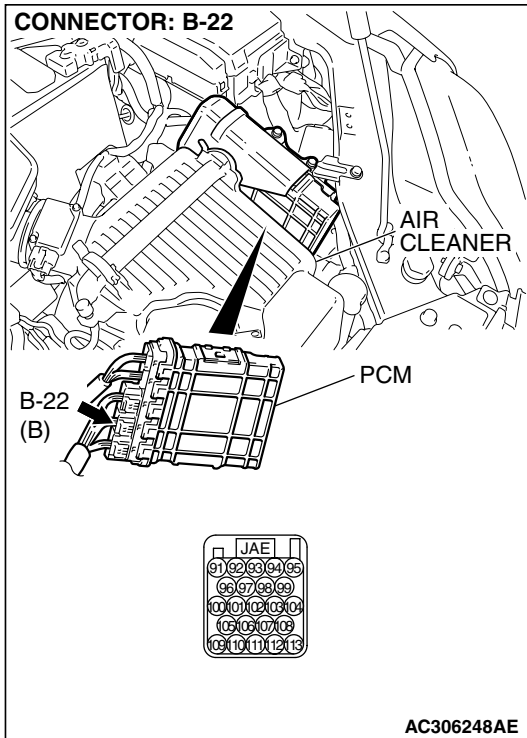
STEP 14. Check the harness for open circuit or damage between PCM connector B-22 terminal 113 and input shaft speed sensor connector B-109 terminal 1.

Q: Is the harness wire in good condition?

YES : Go to Step 16.

NO : Repair or replace the harness wire.





STEP 15. Check PCM connector B-22 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

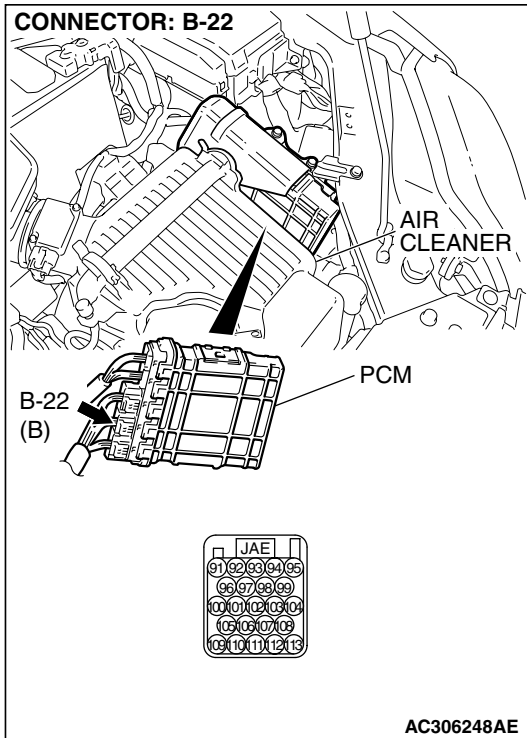
YES : Replace the PCM.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection

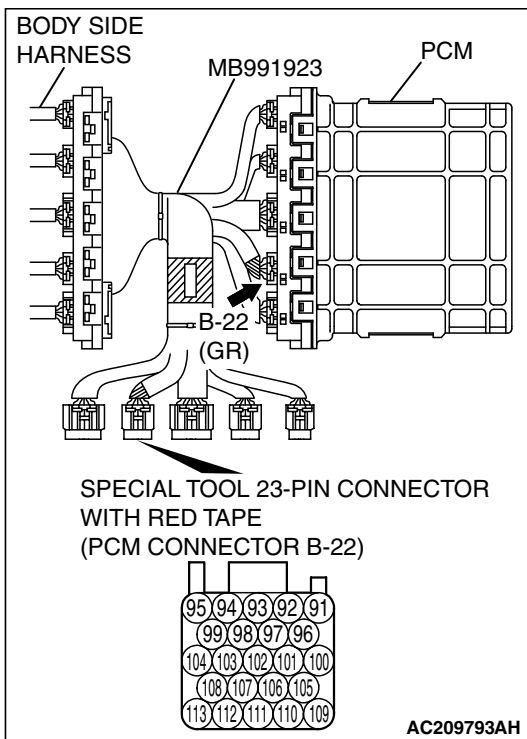
[P.00E-2.](#)

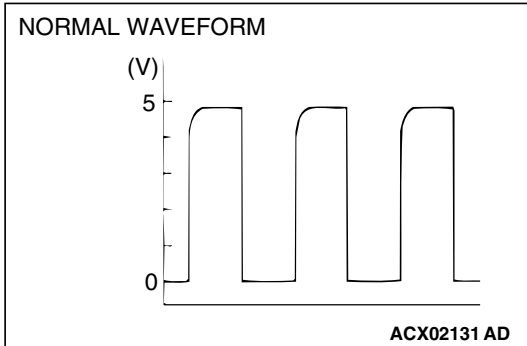
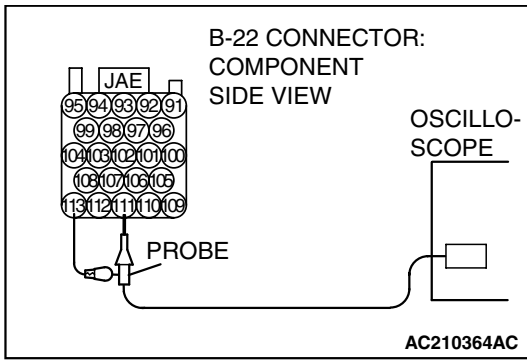
STEP 16. Using the oscilloscope, check the input shaft speed sensor waveform at PCM connectors B-22 by using check harness special tool MB991923.

(1) Disconnect all the connectors from the PCM.



(2) Connect special tool MB991923 (check harness) between the PCM and the body-side harness connector.





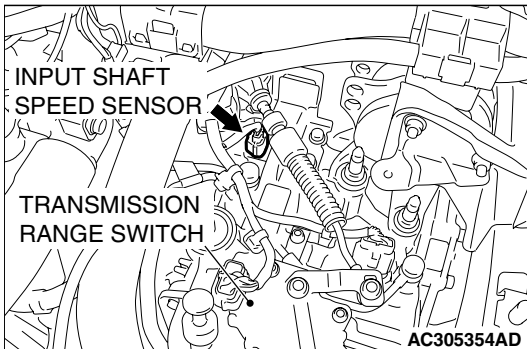
- (3) Connect an oscilloscope probe to PCM connector B-22 terminal 111 and to 113.
- (4) Start the engine and drive the vehicle at constant speed of 50 km/h (31 mph) (Gear range: 3rd gear).

- (5) Check the input shaft speed sensor waveform.
 - The input shaft speed sensor waveform should show a pattern similar to the illustration. The maximum value should be 4.8 volts or more and the minimum value 0.8 volt or less. The output waveform should not contain electrical noise.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the waveform normal?

YES : Go to Step 19.

NO : Go to Step 17.



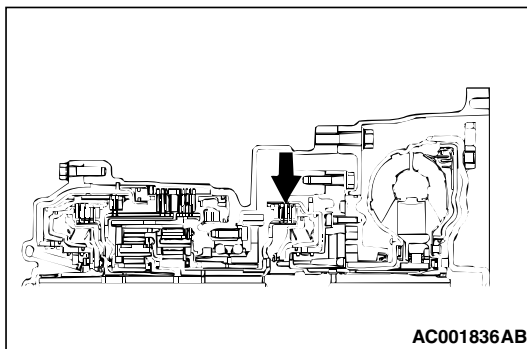
STEP 17. Replace the input shaft speed sensor.

- (1) Replace the input shaft speed sensor. Refer to GROUP 23B, Transaxle P.23B-10.
- (2) Test drive the vehicle.
- (3) Check for A/T diagnostic trouble code.

Q: Is A/T DTC 22 set?

YES : Go to Step 18.

NO : The procedure is complete.



STEP 18. Replace the underdrive clutch retainer.

- (1) Replace the underdrive clutch retainer. Refer to GROUP 23B, Underdrive Clutch and Input Shaft P.23B-62.
- (2) Test drive the vehicle.
- (3) Check for A/T diagnostic trouble code.

Q: Is A/T DTC 22 set?

YES : An A/T DTC may have set due to external radio frequency interference (RFI) possibility caused by cellular phone activity, or aftermarket components installed on the vehicle.

NO : The procedure is complete.

STEP 19. Using scan tool MB991958, check data list item 22: Input Shaft Speed Sensor.

⚠ CAUTION

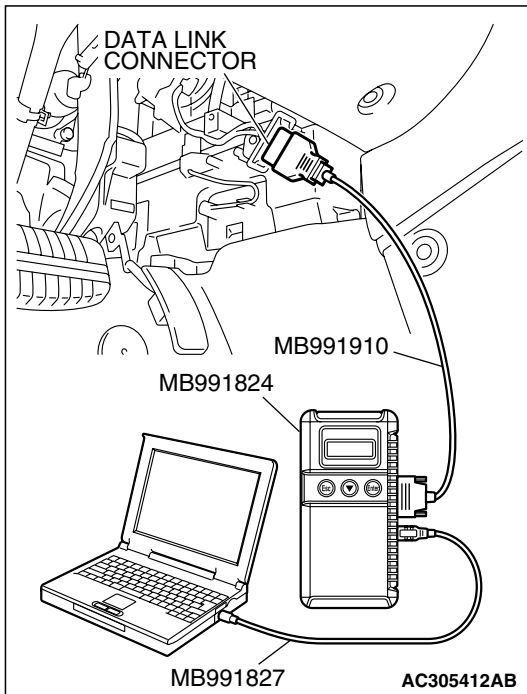
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Start the engine.
- (3) Set scan tool MB991958 to data reading mode.
 - Item 22: Input Shaft Speed Sensor.
 - When driving at constant speed of 50 km/h (31 mph), the display should be "1,400 – 1,700 r/min" (Gear range: 3rd gear).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

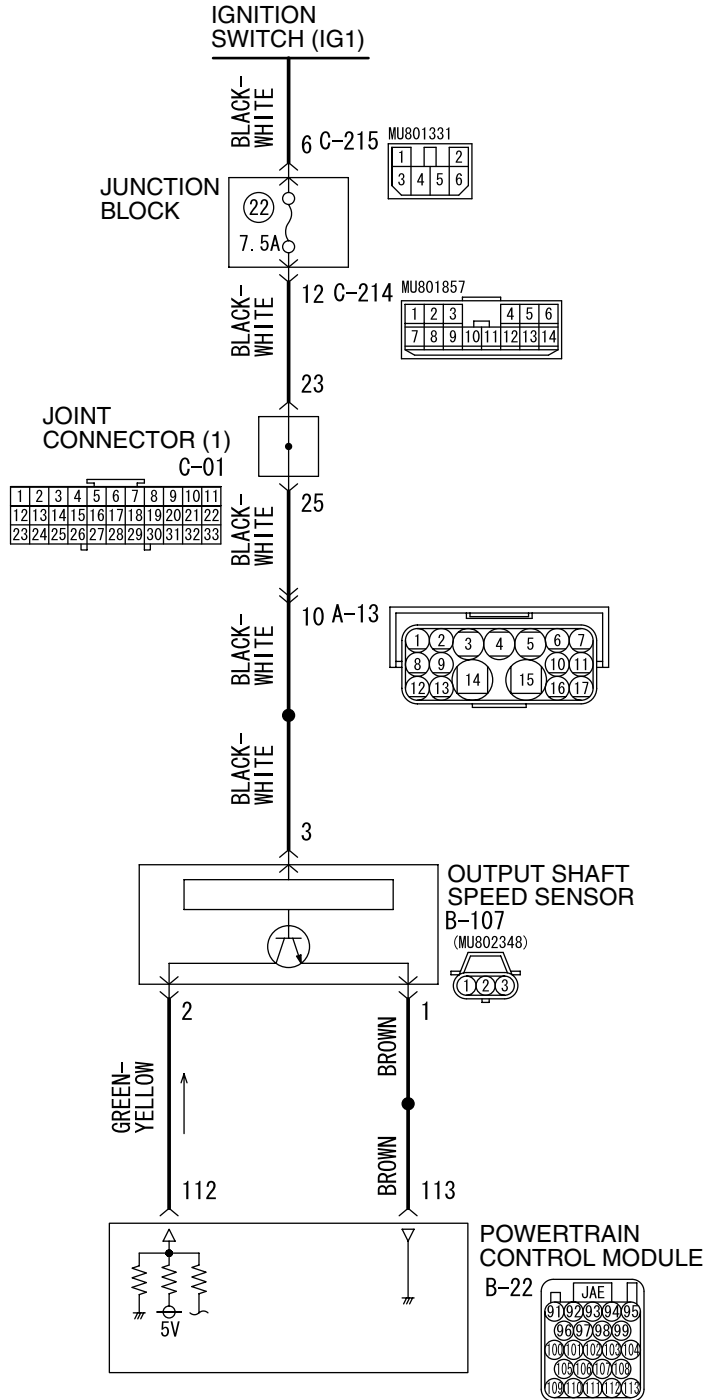
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction [P.00-14](#).

NO : Replace the PCM.

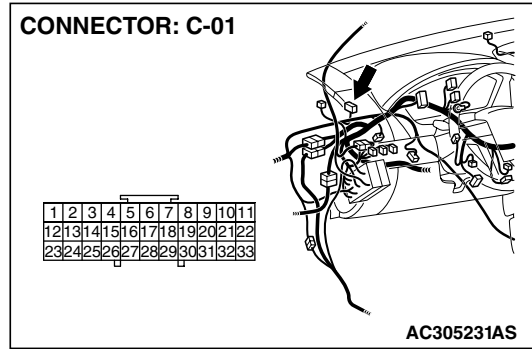
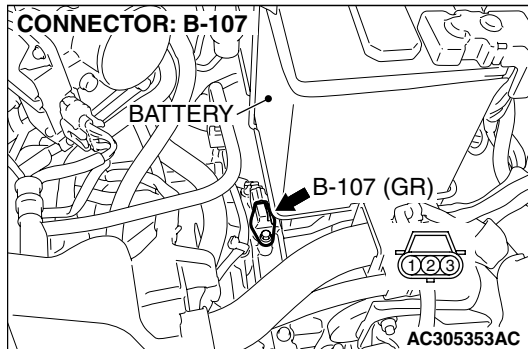
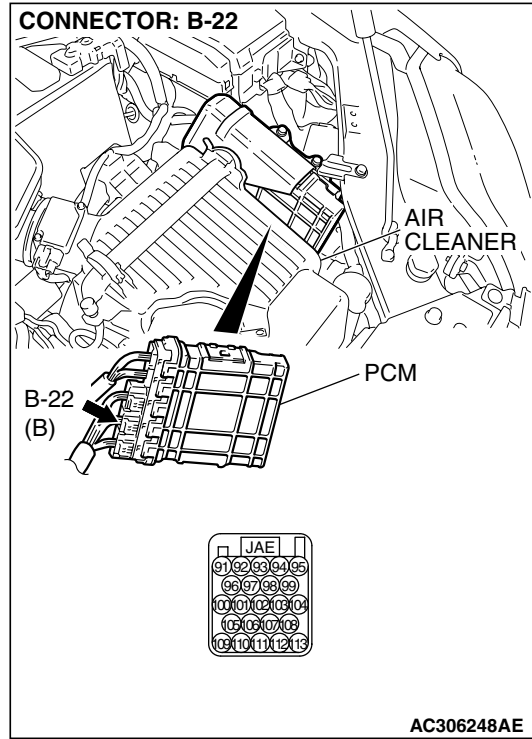
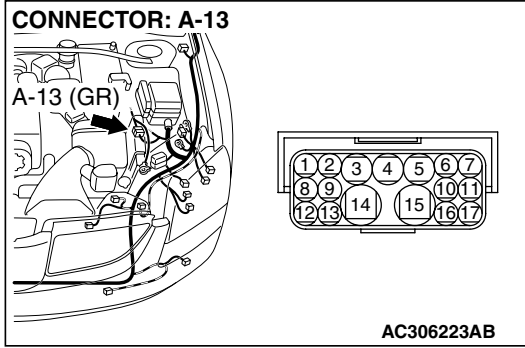


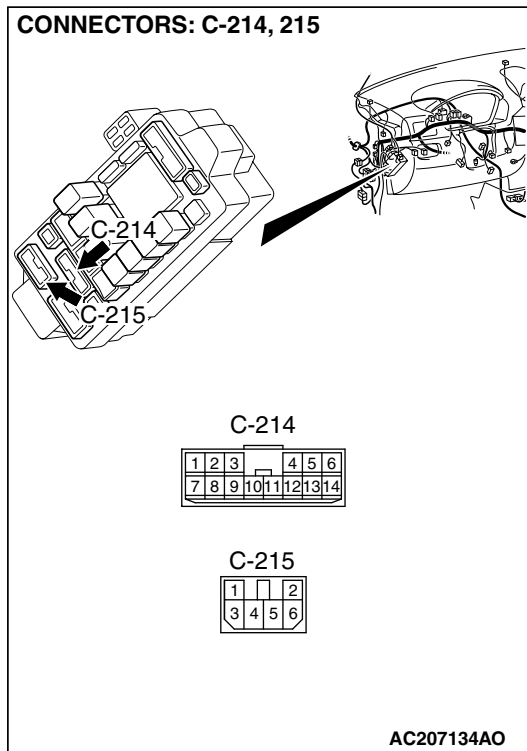
DTC 23 (P0720): Output Shaft Speed Sensor System

Output Shaft Speed Sensor System Circuit



W4P06M03AA
AC209756AC





CIRCUIT OPERATION

- The output shaft speed sensor generates a 0 ⇔ 5 volt pulse signal when the output shaft rotates. The pulse signal frequency increases with a rise output shaft speed.
- The output shaft speed sensor is connected to the PCM (terminals 112 and 113) via the output shaft speed sensor connector (terminals 1 and 2).
- The PCM detects the output shaft speed by the signal input to terminal 112.
- The output shaft speed sensor generates the pulse signal as the teeth of the transfer drive gear pass the magnetic tip of the sensor.

DESCRIPTIONS OF MONITOR METHODS

- <If open circuit occurs during driving test> If abruptly reduced output revolution is detected during driving test, and a difference between turbine revolution and that value calculated from output revolution equals or exceeds specified value, PCM judges that output shaft speed sensor has a failure.
- <If open circuit occurs with vehicle stopped, and driving test is started> If there is no detection pulse from output shaft speed sensor (output rotation) even when engine revolution and turbine revolution both equal or exceed specified value, PCM judges that output shaft speed sensor has a failure.

MONITOR EXECUTION

- Continuous

MONITOR EXECUTION CONDITIONS (OTHER MONITOR AND SENSOR)

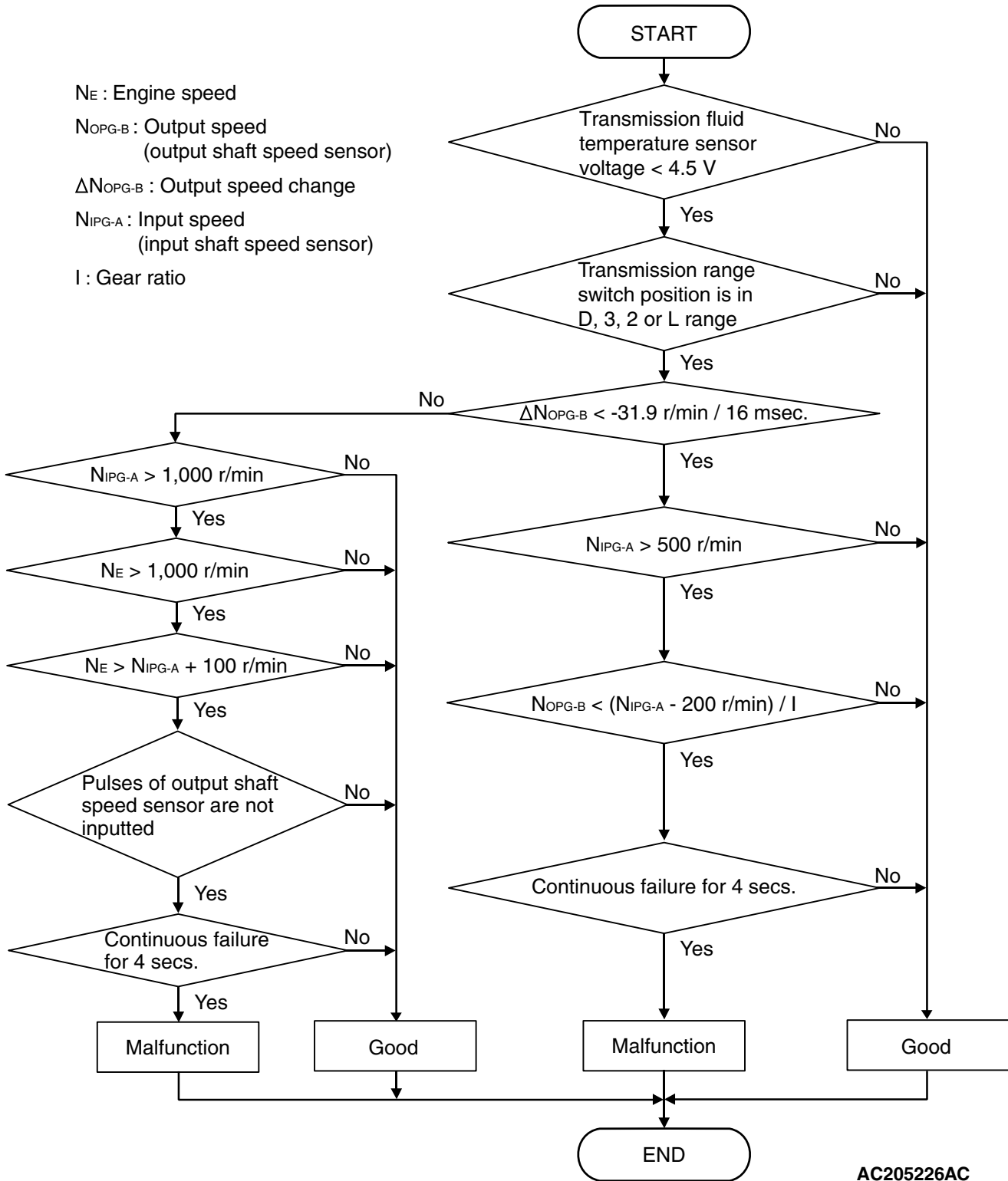
Other Monitor (There is no temporary DTC stored in memory for the item monitored below)

- DTC 22 (P0715): Input shaft speed sensor malfunction
- DTC 36 (P0743): Torque converter clutch solenoid malfunction
- DTC 31 (P0753): Low and reverse solenoid malfunction
- DTC 32 (P0758): Underdrive solenoid malfunction
- DTC 33 (P0763): Second solenoid malfunction
- DTC 34 (P0768): Overdrive solenoid malfunction
- DTC 54 (P1751): A/T control relay malfunction

Sensor (The sensor below is determined to be normal)

- Input shaft speed sensor
- Torque converter clutch solenoid
- Low and reverse solenoid
- Underdrive solenoid
- Second solenoid
- Overdrive solenoid
- A/T control relay

LOGIC FLOW CHARTS (Monitor Sequence)



AC205226AC

DTC SET CONDITIONS

Check Conditions

- Transmission range switch position: D, 3, 2 or L.
- Input speed: 1,000 r/min or more.
- Engine speed: 1,000 r/min or more.
- Transmission fluid temperature sensor voltage: 4.5 volts or less.
- Calculated slip (engine speed - input speed): 100 r/min or more.

Judgement Criteria

- Output speed: no signal change. (4 seconds)
- If DTC 23 (P0720) is set consecutively four times, the transaxle is locked into 3rd gear or 2nd gear as a fail-safe measure, and the "N" range light flashes once per second.

Check Conditions

- Transmission range switch position: D, 3, 2 or L.
- Input speed: 500 r/min or more.
- Transmission fluid temperature sensor voltage: 4.5 volts or less.
- Rapid output speed change: -31.9 r/min / 0.016 second or less.

Judgement Criteria

- Output speed: [(input speed - 200 r/min) / gear ratio] or less. (4 seconds)
- If DTC 23 (P0720) is set consecutively four times, the transaxle is locked into 3rd gear or 2nd gear as a fail-safe measure, and the "N" range light flashes once per second.

OBD-II DRIVE CYCLE PATTERN

Start the engine, and drive for 5 seconds, with 1st gear fixed (L range or 1st gear in sport mode), at 20 km/h (12 mph) or more with 50% or more of throttle valve opening. Then stop the vehicle, and drive again for 5 seconds, with 1st gear fixed (L range or 1st gear in sport mode), at 20 km/h (12 mph) or more with 50% or more of throttle valve opening.

TROUBLESHOOTING HINTS (THE MOST LIKELY CAUSES FOR THIS CODE TO BE SET ARE:)

- Malfunction of the output shaft speed sensor
- Malfunction of the transfer drive gear or driven gear
- Damaged harness or connector
- Malfunction of the PCM

DIAGNOSIS**Required Special Tool:**

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A

STEP 1. Using scan tool MB991958, check data list item 23: Output Shaft Speed Sensor.**⚠ CAUTION**

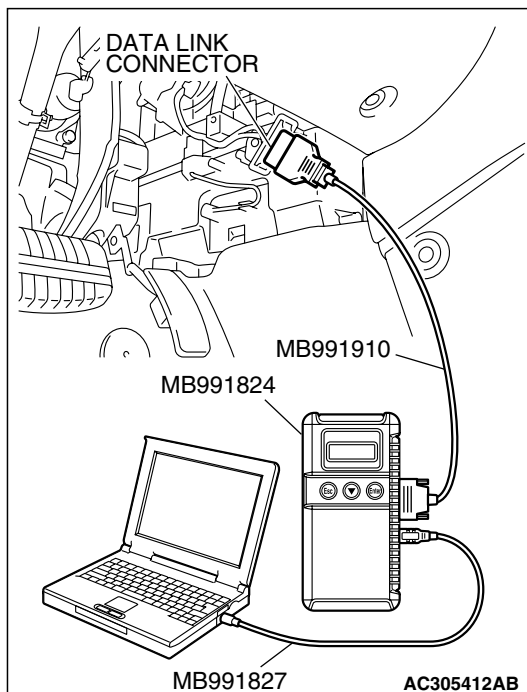
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

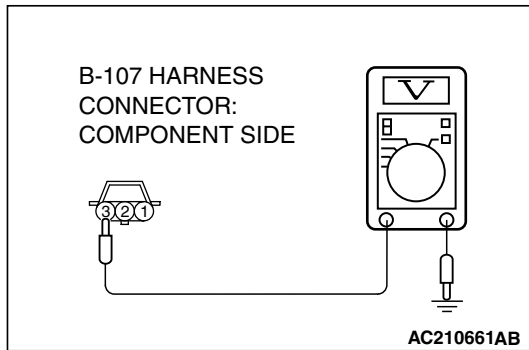
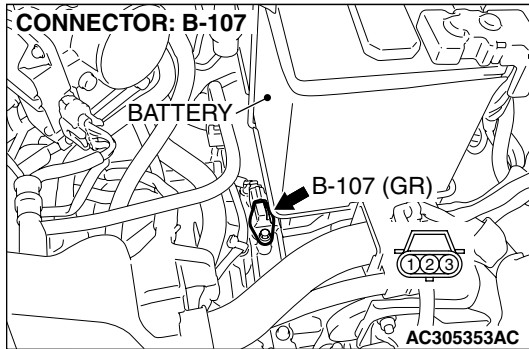
- (1) Connect scan tool MB991958 to the data link connector.
- (2) Start the engine.
- (3) Set scan tool MB991958 to the data reading mode.
 - Item 23: Output Shaft Speed Sensor.
 - When driving at a constant speed of 50km/h (31mph), the display should be "1,400 – 1,700 r/min" (Gear range: 3rd gear).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor within the specified range?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction [P.00-14](#).

NO : Go to Step 2.





STEP 2. Measure the power supply voltage at the output shaft speed sensor connector B-107.

- (1) Disconnect connector B-107 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between terminal 3 and ground.
 - The voltage should measure battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage battery positive voltage?

- YES :** Go to Step 5.
NO : Go to Step 3.

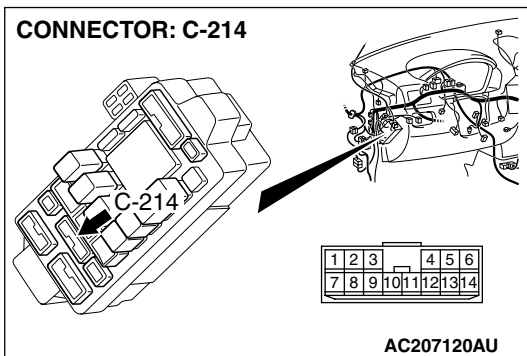
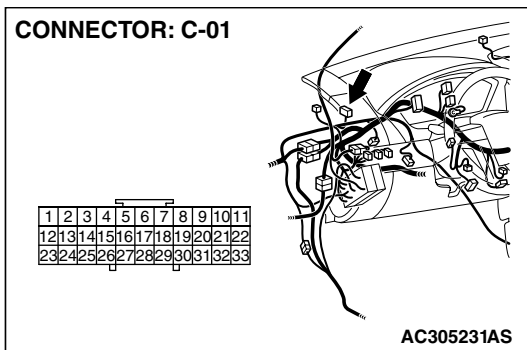
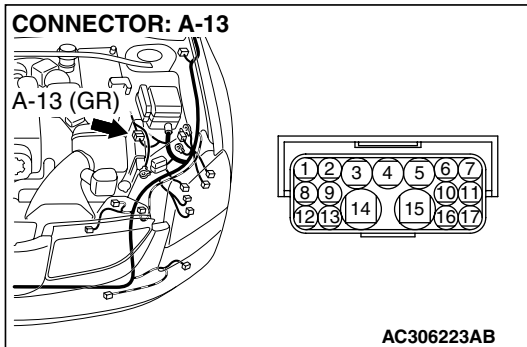
STEP 3. Check intermediate connector A-13, joint connector (1) C-01 and junction block connector C-214 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 4.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection

[P.00E-2.](#)

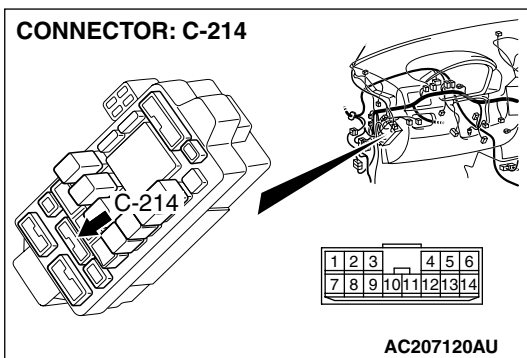
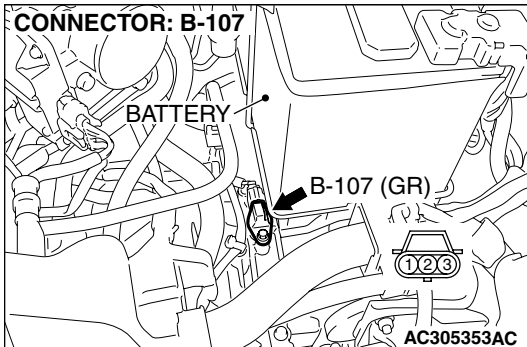


STEP 4. Check the harness for open circuit or short circuit to ground between the output shaft speed sensor connector B-107 terminal 3 and the junction block connector C-214 terminal 12.

Q: Is the harness wire in good condition?

YES : Go to Step 5.

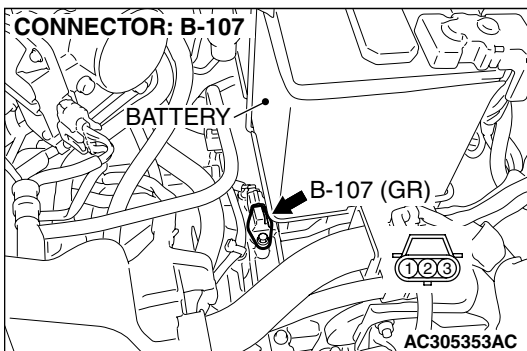
NO : Repair or replace the harness wire.



STEP 5. Measure the PCM to speed sensor output voltage at the output shaft speed sensor connector B-107.

(1) Disconnect connector B-107 from the speed sensor and measure voltage at the harness side.

(2) Turn the ignition switch to the "ON" position.



(3) Measure the voltage between terminal 2 and ground.

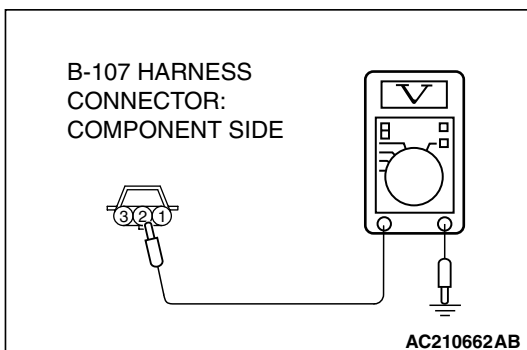
- The voltage should measure between 4.5 and 4.9 volts.

(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage between 4.5 and 4.9 volts?

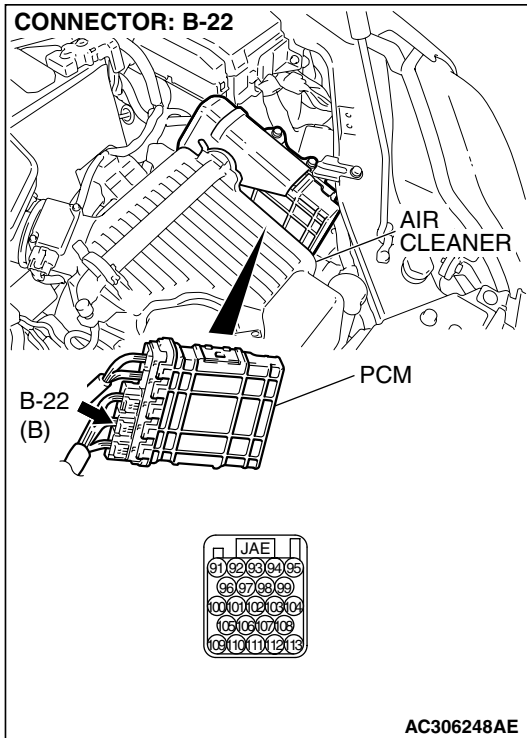
YES : Go to Step 11.

NO : Go to Step 6.



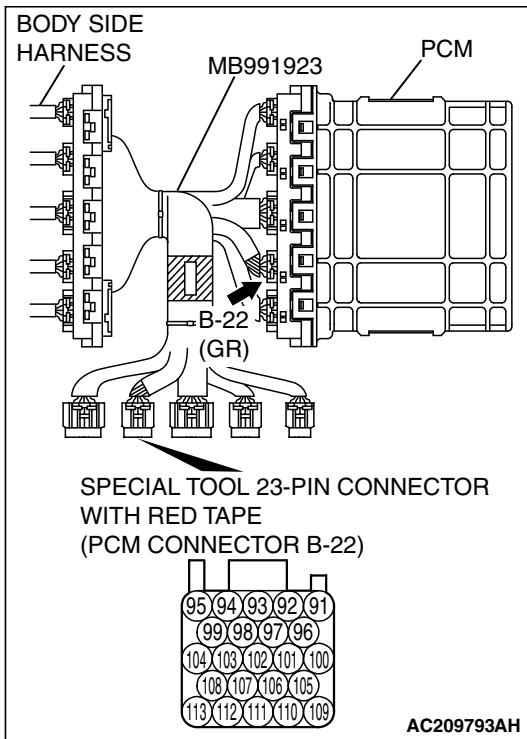
STEP 6. Measure the PCM output voltage to the speed sensor at the PCM connector B-22 by using check harness special tool MB991923.

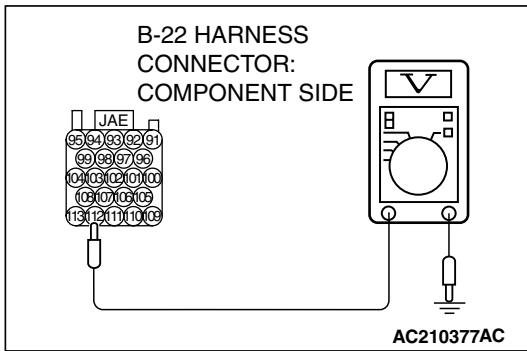
(1) Disconnect all the connectors from the PCM.



(2) Connect special tool MB991923 (check harness) between the PCM and the body-side harness connector.

(3) Turn the ignition switch to the "ON" position.



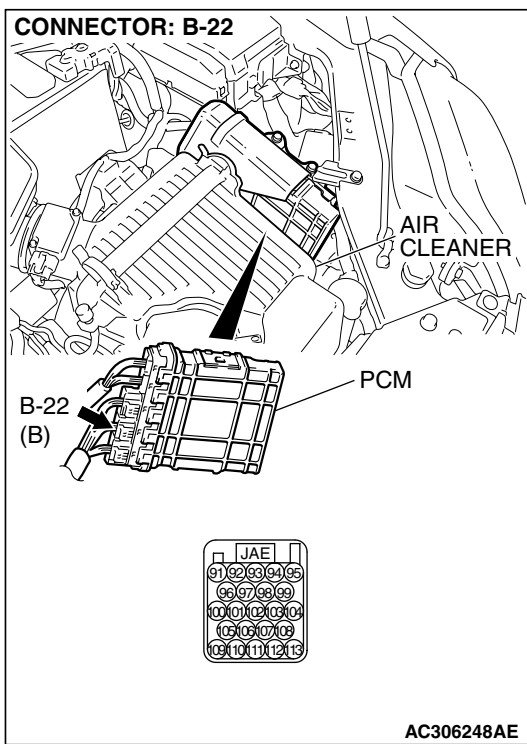


- (4) Measure the voltage between terminal 112 and ground.
 • The voltage should measure between 4.5 and 4.9 volts.
 (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage between 4.5 and 4.9 volts?

YES : Go to Step 7.

NO : Go to Step 9.



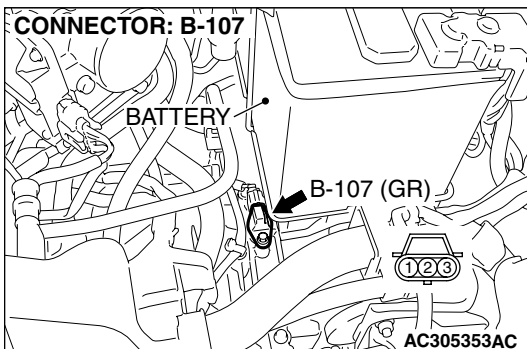
STEP 7. Check PCM connector B-22 and output shaft speed sensor connector B-107 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors in good condition?

YES : Go to Step 8.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection

[P.00E-2.](#)

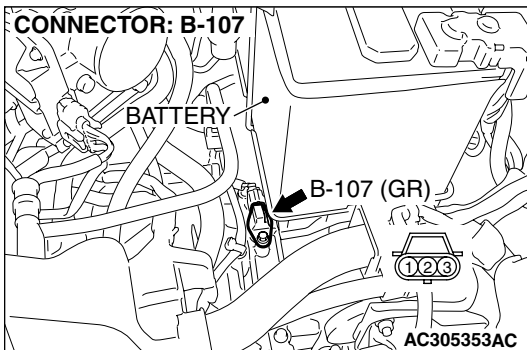
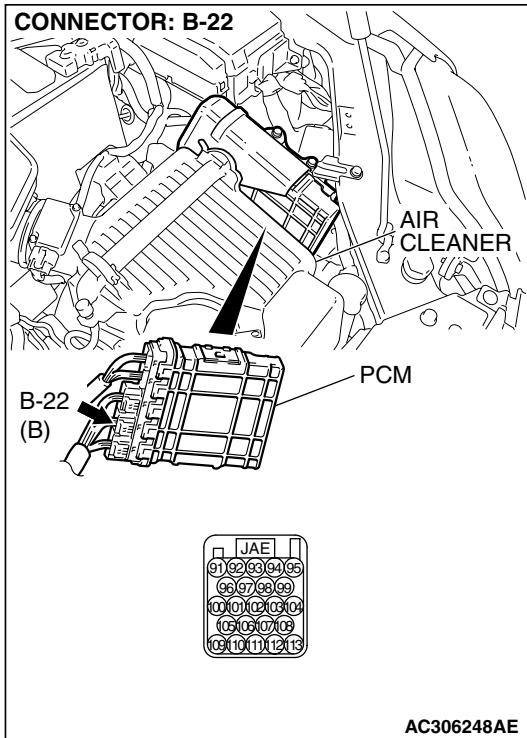


STEP 8. Check the harness for open circuit or damage between PCM connector B-22 terminal 112 and output shaft speed sensor connector B-107 terminal 2.

Q: Is the harness wire in good condition?

YES : Go to Step 19.

NO : Repair or replace the harness wire.



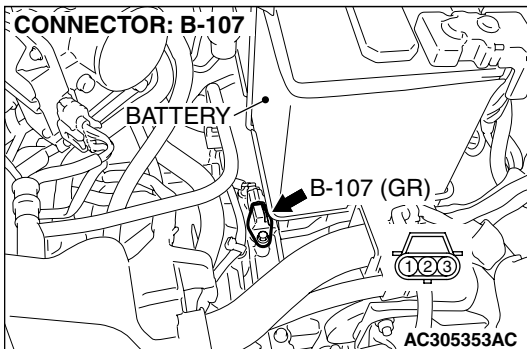
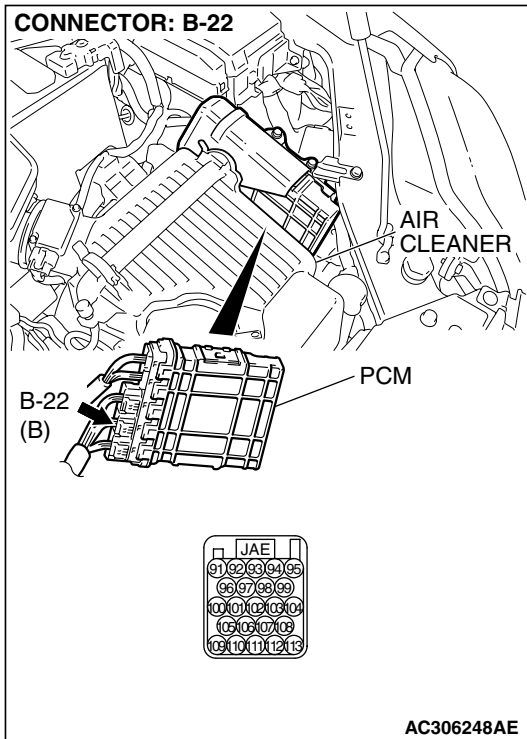
STEP 9. Check PCM connector B-22 and output shaft speed sensor connector B-107 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 10.

NO : Repair or replace the damages components. Refer to GROUP 00E, Hamess Connector Inspection

[P.00E-2.](#)

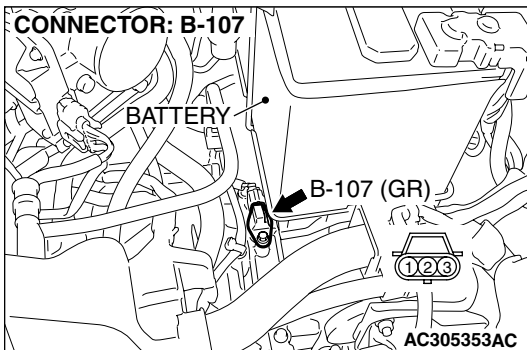
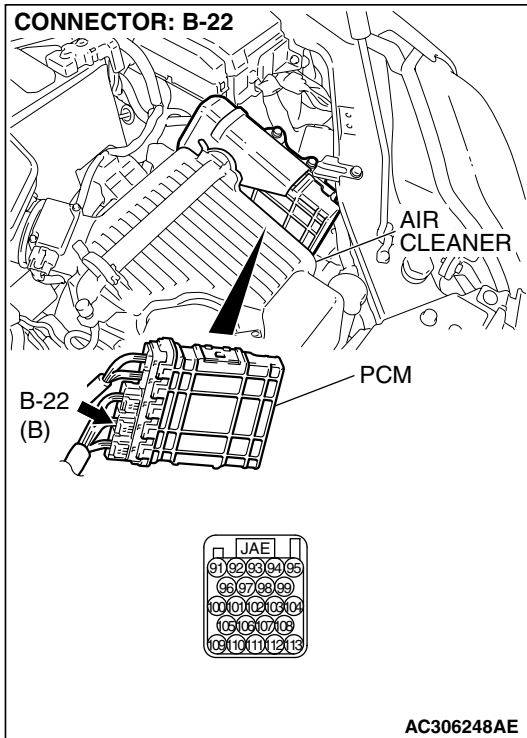


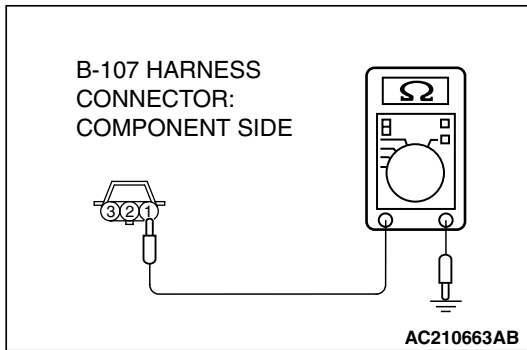
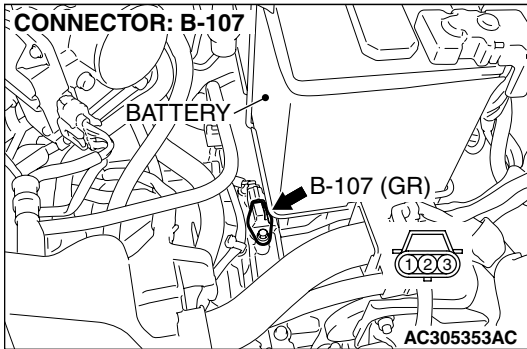
STEP 10. Check the harness for short circuit to ground between PCM connector B-22 terminal 112 and output shaft speed sensor connector B-107 terminal 2.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

NO : Repair or replace the harness wire.





STEP 11. Measure the ground circuit for resistance at the output shaft speed sensor connector B-107.

(1) Disconnect connector B-107 from the speed sensor and measure at the harness side.

(2) Measure the resistance between terminal 1 and ground.
• The resistance should measure less than 2 ohms.

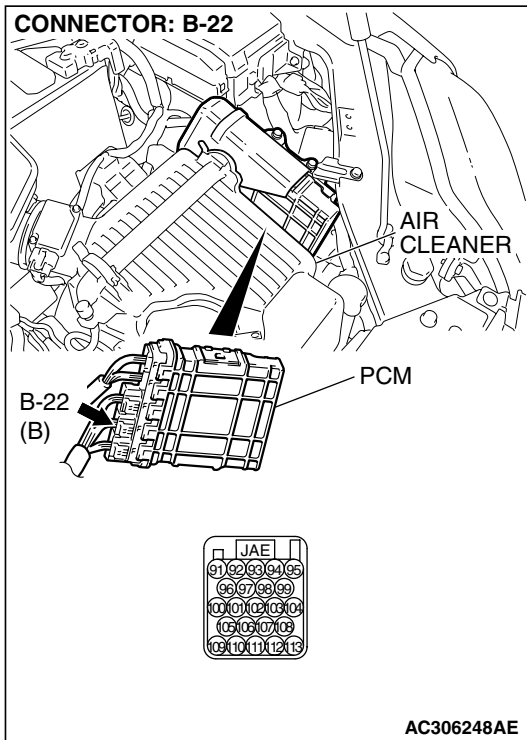
Q: Is the measured resistance less than 2 ohms?

YES : Go to Step 16.

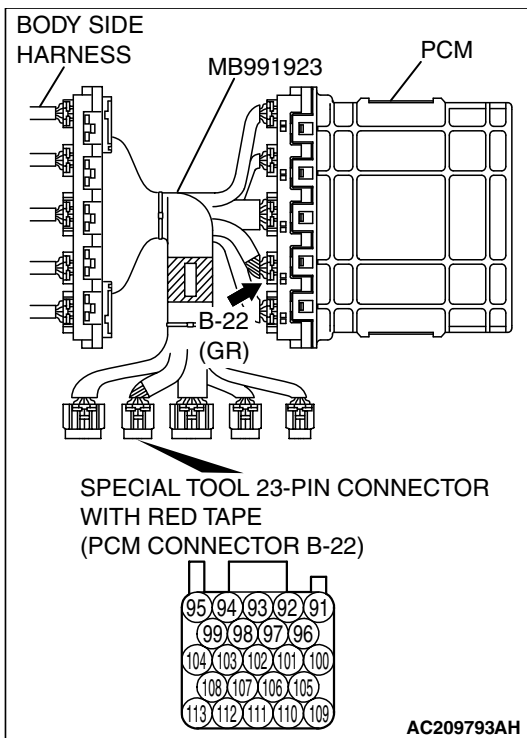
NO : Go to Step 12.

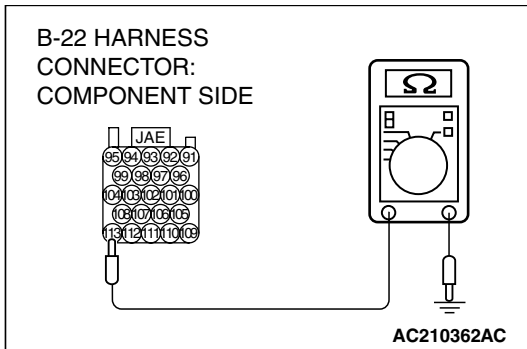
STEP 12. Measure the resistance at the PCM connector B-22 by using check harness special tool MB991923.

(1) Disconnect all the connectors from the PCM.



- (2) Connect special tool MB991923 (check harness) between the PCM and the body-side harness connector.
- (3) Turn the ignition switch to the "ON" position.



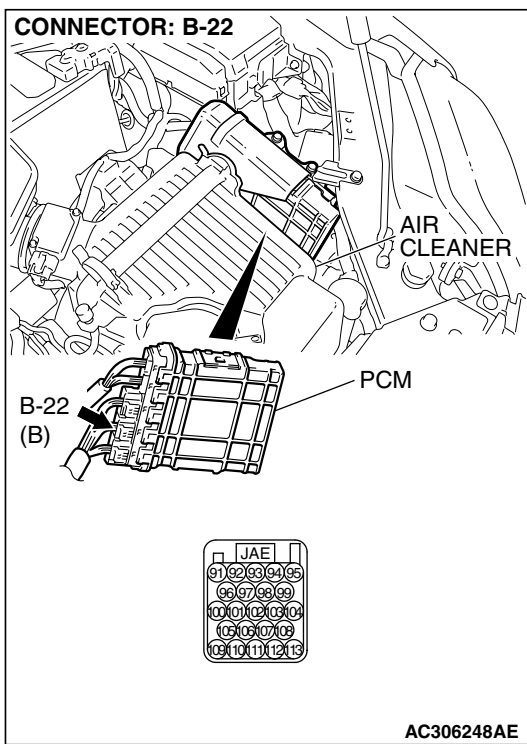


- (4) Measure the resistance between terminal 113 and ground.
 • The resistance should measure less than 2 ohms.
 (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured resistance less than 2 ohms?

YES : Go to Step 13.

NO : Go to Step 15.



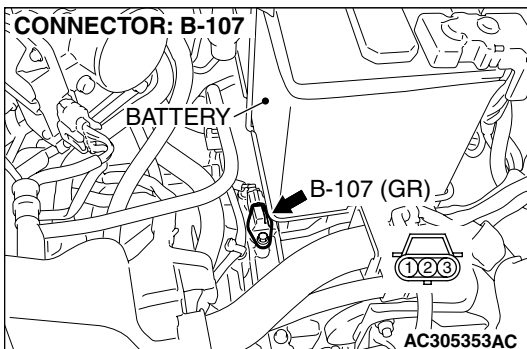
STEP 13. Check PCM connector B-22 and output shaft speed sensor connector B-107 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 14.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection

[P.00E-2.](#)

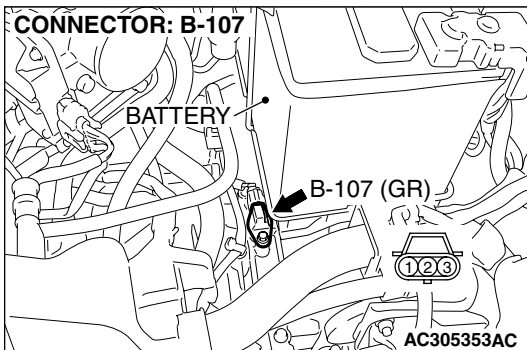
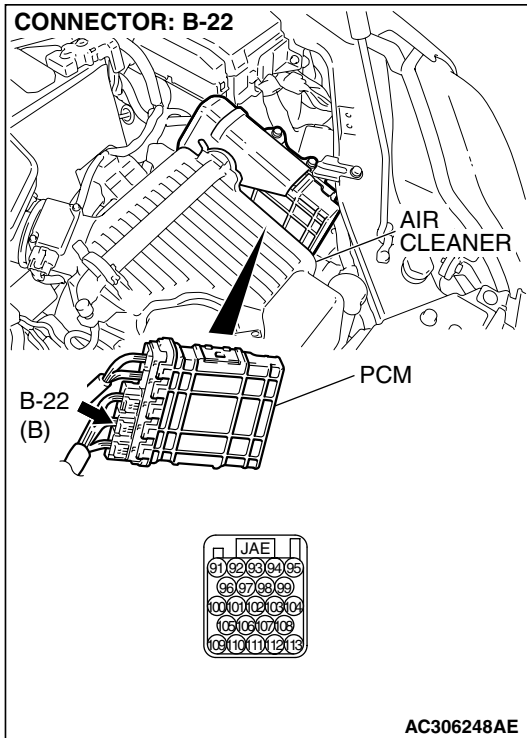


STEP 14. Check the harness for open circuit or damage between PCM connector B-22 terminal 113 and output shaft speed sensor connector B-107 terminal 1.

Q: Is the harness wire in good condition?

YES : Go to Step 16.

NO : Repair or replace the harness wire.



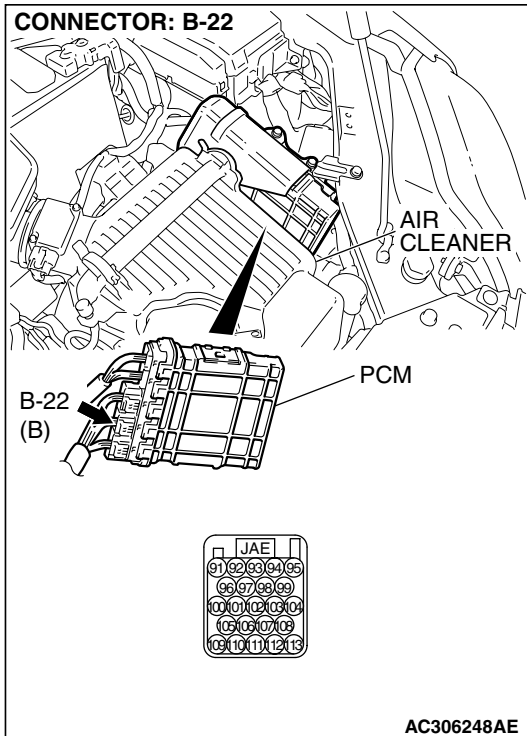
STEP 15. Check PCM connector B-22 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Replace the PCM.

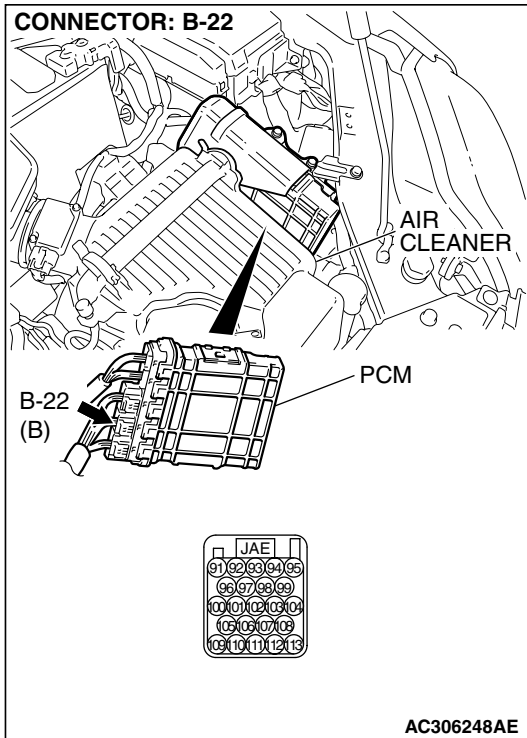
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection

[P.00E-2.](#)

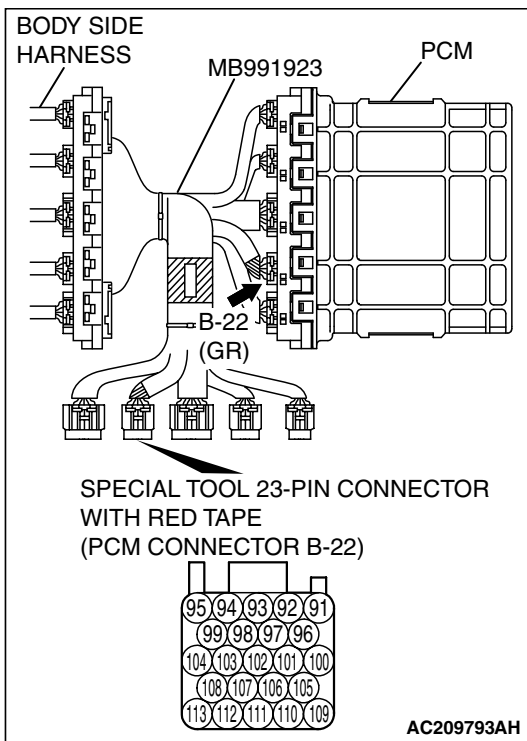


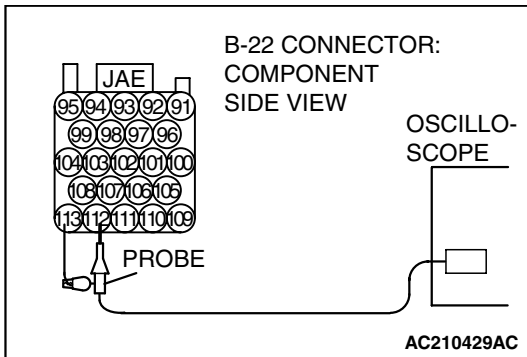
STEP 16. Using the oscilloscope, check the output shaft speed sensor waveform at PCM connectors B-22 by using check harness special tool MB991923.

(1) Disconnect all the connectors from the PCM.

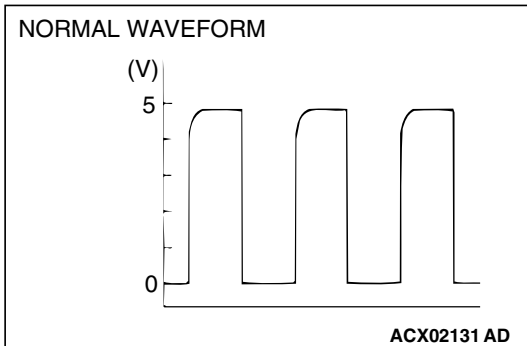


(2) Connect special tool MB991923 (check harness) between the PCM and the body-side harness connector.





- (3) Connect an oscilloscope probe to PCM connector B-22 terminal 112 and 113.
- (4) Start the engine and drive the vehicle at constant speed of 50 km/h (31 mph) (Gear range: 3rd gear).

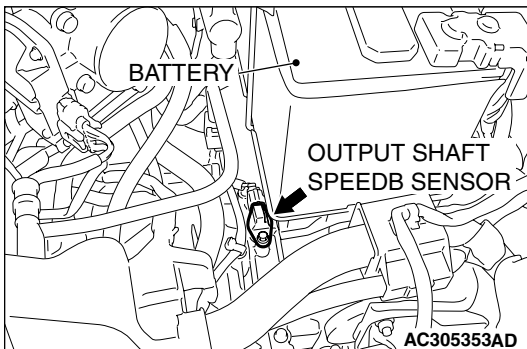


- (5) Check the output shaft speed sensor waveform.
 - The output shaft speed sensor waveform should show a pattern similar to the illustration. The maximum value should be 4.8 volts or more and the minimum value 0.8 volt or less. The output waveform should not contain electrical noise.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the waveform normal?

YES : Go to Step 19.

NO : Go to Step 17.



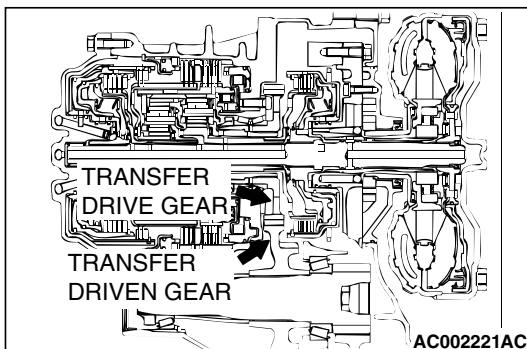
STEP 17. Replace the output shaft speed sensor.

- (1) Replace the output shaft speed sensor. Refer to GROUP 23B, Transaxle [P.23B-10](#).
- (2) Test drive the vehicle.
- (3) Check for A/T diagnostic trouble code.

Q: Is A/T DTC 23 set?

YES : Go to Step 18.

NO : The procedure is complete.



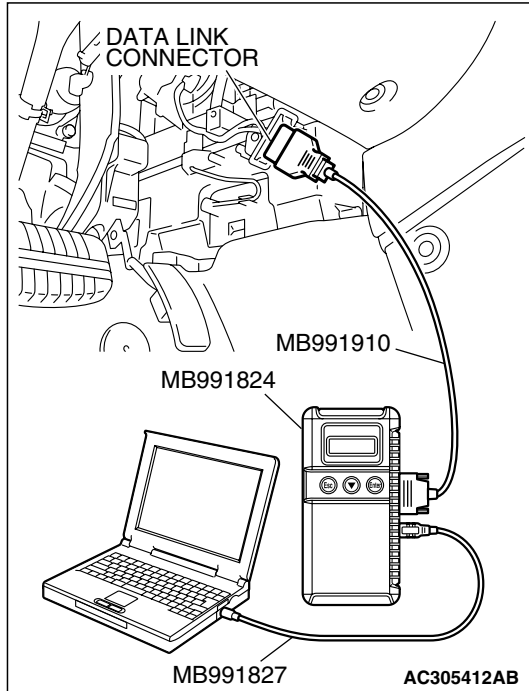
STEP 18. Replace the transfer drive gear or driven gear.

- (1) Replace the transfer drive gear or driven gear. Refer to GROUP 23B, Transaxle [P.23B-10](#), Output Shaft [P.23B-73](#).
- (2) Test drive the vehicle.
- (3) Check for A/T diagnostic trouble code.

Q: Is A/T DTC 23 set?

YES : An A/T DTC may have set due to external radio frequency interference (RFI) possibility caused by cellular phone activity, or aftermarket components installed on the vehicle.

NO : The procedure is complete.



STEP 19. Using scan tool MB991958, check data list item 23: Output Shaft Speed Sensor.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

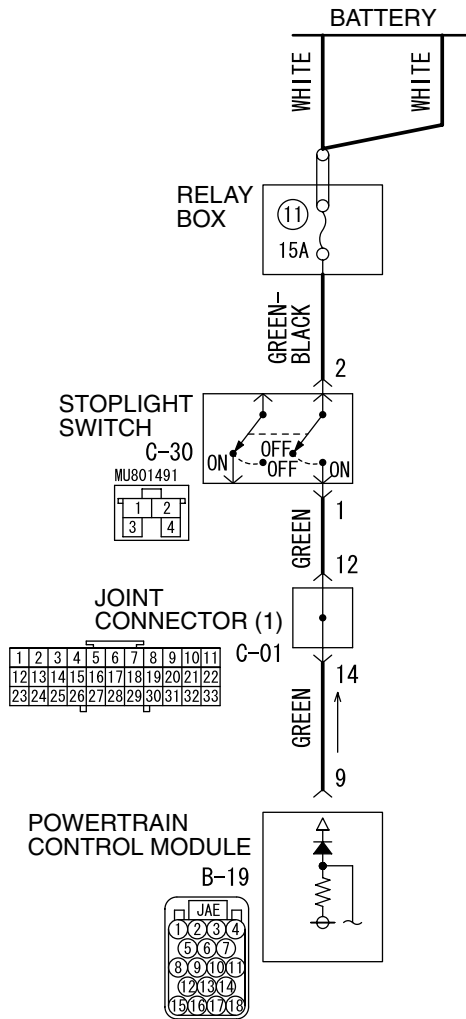
- (1) Connect scan tool MB991958 to the data link connector.
- (2) Start the engine.
- (3) Set scan tool MB991958 to data reading mode.
 - Item 23: Output Shaft Speed Sensor.
 - When driving at constant speed of 50 km/h (31 mph), the display should be "1,400 – 1,700 r/min" (Gear range: 3rd gear).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

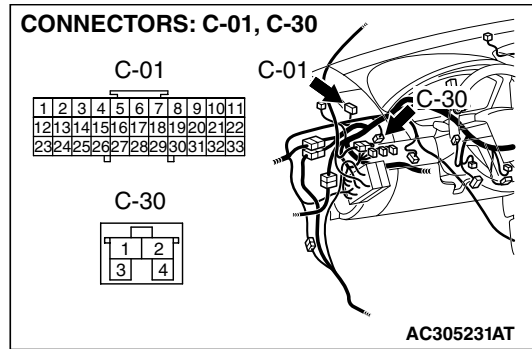
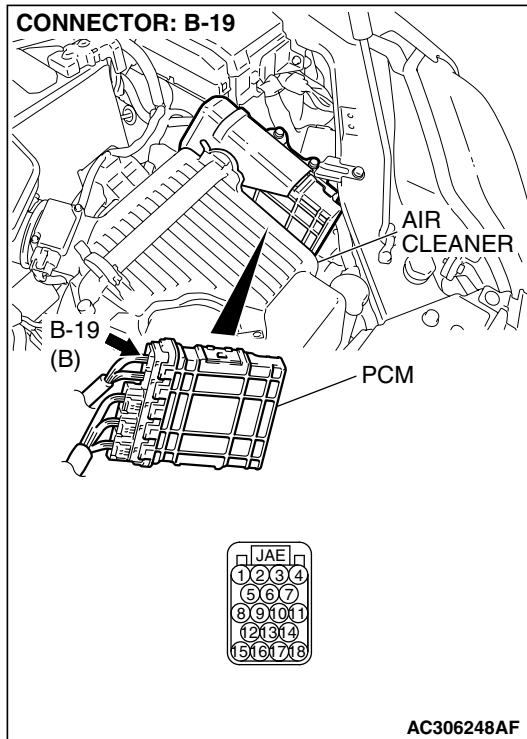
- YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction [P.00-14](#).
- NO :** Replace the PCM.

DTC 26: Stoplight Switch System

Stoplight Switch System Circuit



W4P06M04AA
AC209757AC



CIRCUIT OPERATION

- Battery positive voltage is supplied to the stoplight switch (terminal 2).
- When the brake pedal is depressed, battery positive voltage is applied to the PCM (terminal 9).

DTC SET CONDITIONS

If the stoplight switch is on for five minutes or more while driving above 50 km/h (31 mph), or all of the stop light bulbs are blown, it is judged there is a short circuit or open circuit in the stoplight switch. This causes DTC 26 to be set.

TROUBLESHOOTING HINTS (THE MOST LIKELY CAUSES FOR THIS CODE TO BE SET ARE:)

- Malfunction of the stoplight switch
- Malfunction of stoplight valve
- Damaged harness or connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991910: MUT-III Main Harness A

STEP 1. Check the brake pedal height.

Refer to GROUP 35A, On-vehicle Service – Brake Pedal Check and Adjustment P.35A-13.

Q: Is the height adjusted properly?

YES : Go to Step 2.

NO : Adjust the brake pedal to the proper height.

STEP 2. Check the stoplight valve.

Refer to GROUP 54A, Rear combination light [P.54A-119](#).

Q: Is the stoplight valve in good condition?

YES : Go to Step 3.

NO : Replace the stoplight switch. Refer to GROUP 35A, Brake Pedal [P.35A-24](#).

STEP 3. Using scan tool MB991958, check data list item 26: Stoplight Switch.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.

(2) Turn the ignition switch to the "ON" position.

(3) Set scan tool MB991958 to the data reading mode.

- Item 26: Stoplight Switch.

- When the brake pedal is depressed, the display on scan tool MB991958 should be "ON."

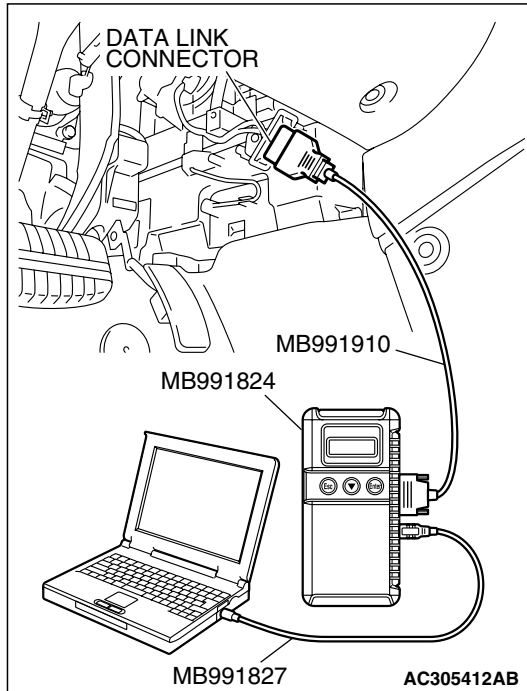
- When the brake pedal is not depressed, the display on scan tool MB991958 should be "OFF."

(4) Turn the ignition switch to the "LOCK" (OFF) position.

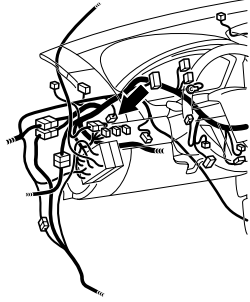
Q: Is the switch operating properly?

YES : It can be assumed that this malfunction may be intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction [P.00-14](#).

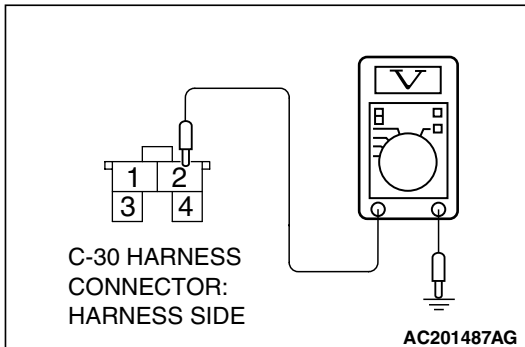
NO : Go to Step 4.



CONNECTOR: C-30



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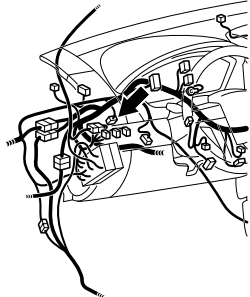
STEP 4. Measure the stoplight switch power supply voltage at connector C-30 by backprobing.

- (1) Remove the stoplight switch from the mounting bracket.
- (2) Do not disconnect connector C-30.

- (3) Measure the voltage between terminal 2 and ground by backprobing.
 - The voltage should measure battery positive voltage.

Q: Is the measured voltage battery positive voltage?**YES :** Go to Step 7.**NO :** Go to step 5.

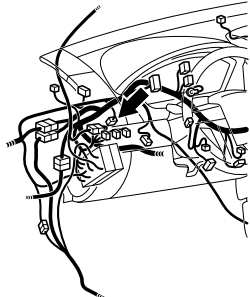
CONNECTOR: C-30



AC305231AU

STEP 5. Check stoplight switch connector C-30 for loose, corroded or damaged terminals, or terminals pushed back in the connector.**Q: Are the connector and terminals in good condition?****YES :** Go to Step 6.**NO :** Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection[P.00E-2.](#)

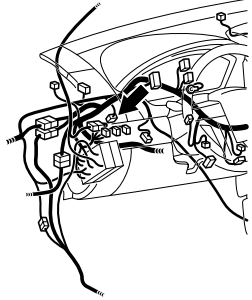
CONNECTOR: C-30



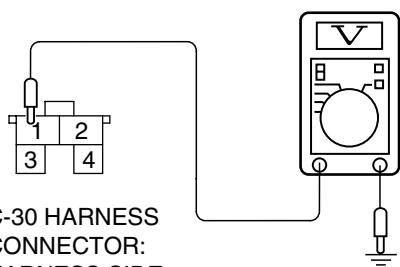
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STEP 6. Check the harness for damage between stoplight switch connector C-30 terminal 2 and the power supply fuse.**Q: Is the harness wire in good condition?****YES :** Go to Step 7.**NO :** Repair or replace the harness wire.

CONNECTOR: C-30



AC305231AU



C-30 HARNESS
CONNECTOR:
HARNESS SIDE

AC201041AH

STEP 7. Measure the stoplight switch output voltage to the PCM at connector C-30 by backprobing.

- (1) Remove the stoplight switch from the mounting bracket.
- (2) Do not disconnect connector C-30.

- (3) Measure the voltage between terminal 1 and ground by backprobing.
 - When the switch button is out (closed circuit), voltage should equal battery positive voltage.
 - When the switch button is depressed (open circuit), voltage should measure less than 1.0 volt.

Q: Is the measured voltage battery positive voltage with the switch button released (closed circuit), and less than 1.0 volt with the switch button depressed (open circuit)?

YES : Go to Step 9.

NO : Go to Step 8.

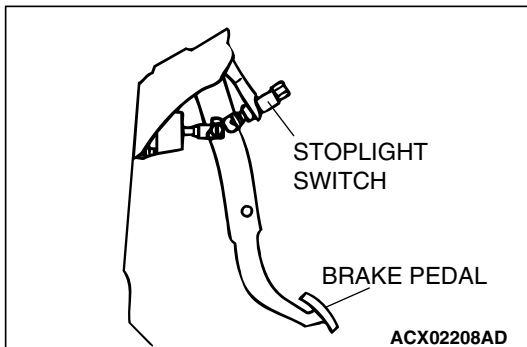
STEP 8. Check the stoplight switch.

Refer to GROUP 35A, On-vehicle Service – Stoplight Switch Check [P.35A-25](#).

Q: Does the stoplight switch pass the checks?

YES : Go to Step 9.

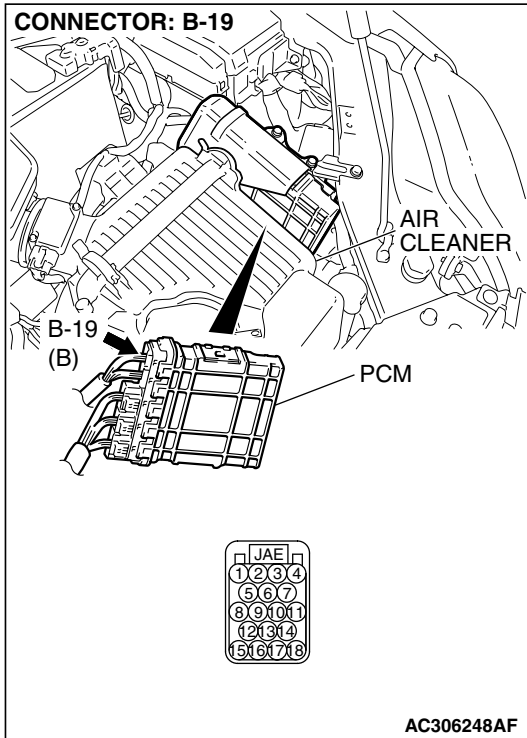
NO : Replace the stoplight switch. Refer to GROUP 35A, Brake Pedal [P.35A-24](#).



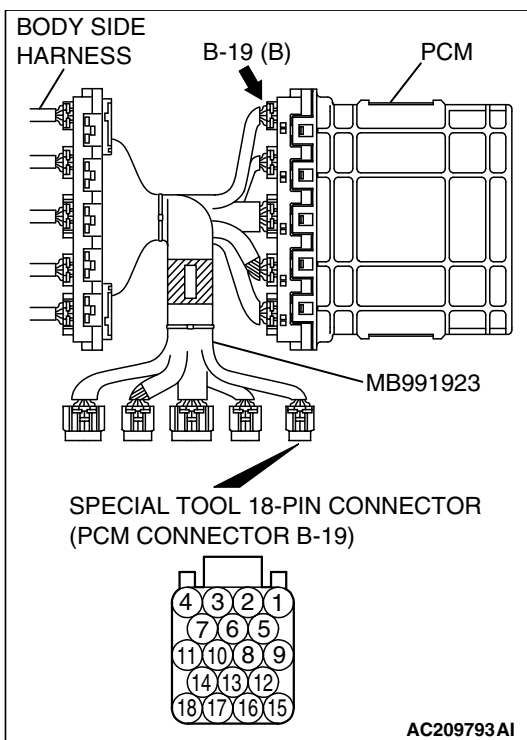
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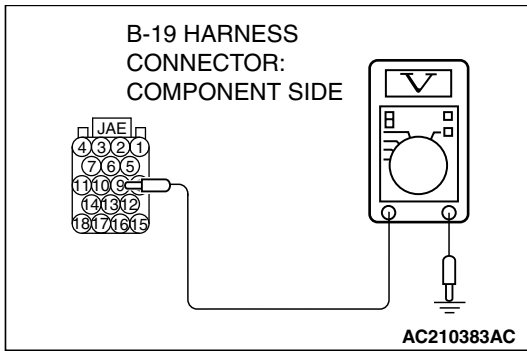
STEP 9. Measure the stoplight switch output voltage at the PCM connector B-19 by using check harness special tool MB991923.

- (1) Install the stoplight switch into the mounting bracket if it was removed.
- (2) Disconnect all the connectors from the PCM.



- (3) Connect special tool MB991923 (check harness) between the PCM and the body-side harness connector.





- (4) Measure the voltage between terminal 9 and ground.
- When the brake pedal is depressed, voltage should measure battery positive voltage.
 - When the brake pedal is not depressed, voltage should measure less than 1.0 volt.

Q: Is the measured voltage battery positive voltage with the brake pedal depressed (closed circuit), and less than 1.0 volt with the brake pedal released (open circuit)?

YES : Go to Step 12.

NO : Go to Step 10.

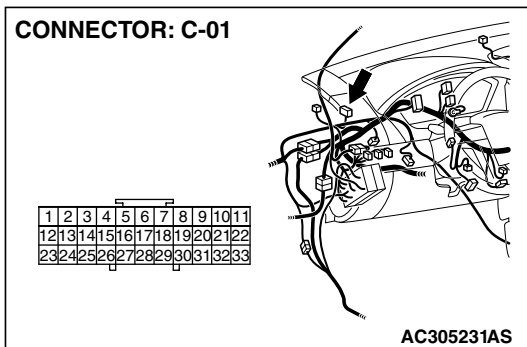
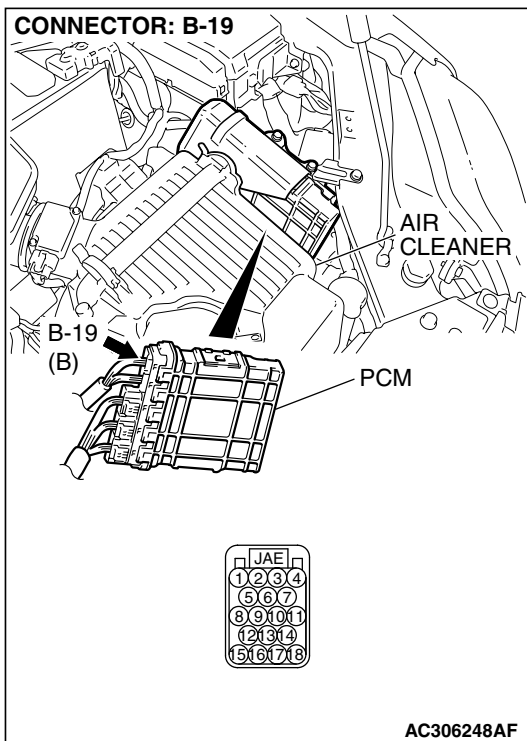
STEP10. Check PCM connector B-19 and joint connector (1) C-01 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 11.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection

[P.00E-2.](#)

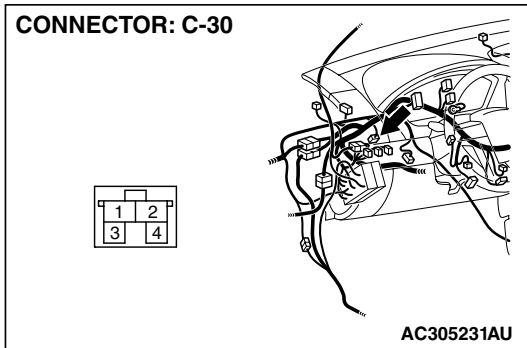
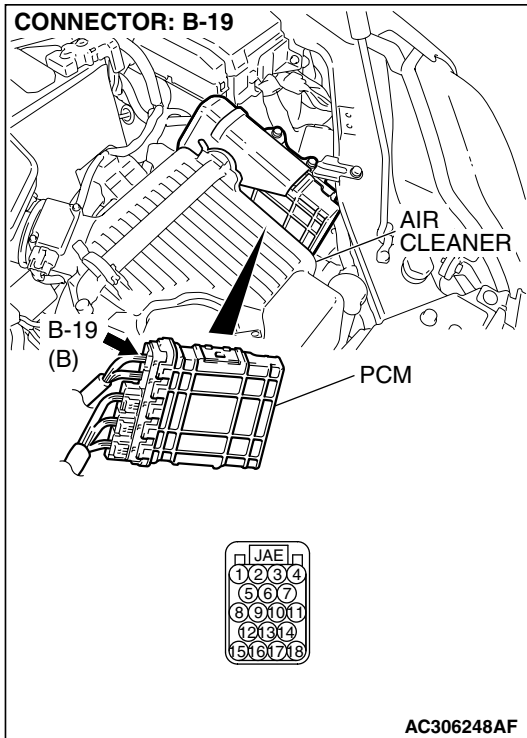


STEP 11. Check the harness for damage between PCM connector B-19 terminal 9 and stoplight switch connector C-30 terminal 1.

Q: Is the harness wire in good condition?

YES : Go to Step 12.

NO : Repair or replace the harness wire.



STEP 12. Using scan tool MB991958, check data list item 26: Stoplight Switch.

⚠ CAUTION

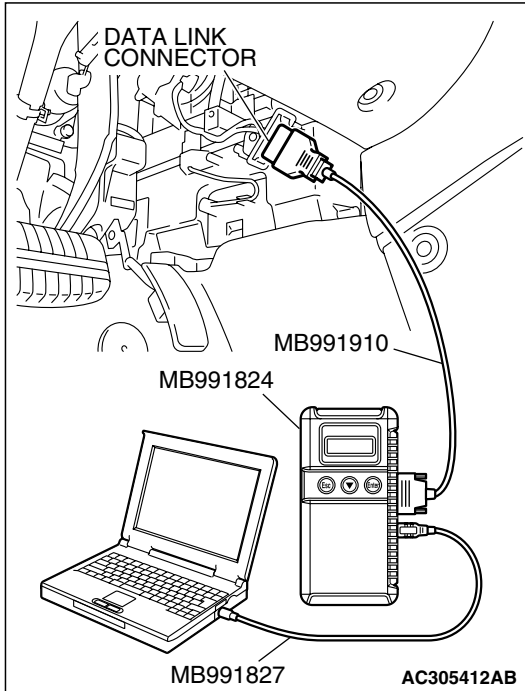
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set scan tool MB991958 to the data reading mode.
 - Item 26: Stoplight Switch.
 - When the brake pedal is depressed, the display on scan tool MB991958 should be "ON."
 - When the brake pedal is not depressed, the display on scan tool MB991958 should be "OFF."
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the switch operating properly?

YES : It can be assumed that this malfunction may be intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction [P.00-14](#).

NO : Replace the PCM.



NEXT>>